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EXPERIENCES WITH THE USE OF AN ARTIFICIAL KIDNEY.

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IN 1958, the University Department of Surgery at the Alfred Hospital, aided by the generous support of many donors, obtained a Kolff twin-coil artificial kidney. After a period of preliminary trial with experimental animals, the machine was used clinically for the first time in May, 1958. The following paper represents the results of eighteen months' clinical experience with the machine.

PRINCIPLE OF THE ARTIFICIAL KIDNEY.

All artificial kidneys remove retention products from the blood by exchange through a semi-permeable membrane of "Cellophane". This can occur by dialysis (the diffusion of substances below a molecular weight of approximately 15,000 across the membrane due to a concentration gradient) or by ultra-filtration, which implies mass movement of fluid across the membrane due to the existence of a pressure head.

Some kidneys operate by dialysis alone (Kolff rotating drum, 1944), others use both methods (Kolff twin-coil, 1956; Alwall, 1947; Skeggs-Leonards, 1949), and the latter type is usually preferable.

Wet "Cellophane", consisting of cellulose, glycerine and minute amounts of sulphur, forms a membrane with a thickness of about 80μ. In this state it acts as a semi-permeable membrane with a pore size of 25 Å, which is of the same order of magnitude as the pore radius of the capillaries in the glomerular membrane. Ions and molecules such as urea, uric acid, creatine, glucose and the serum electrolytes pass across the membrane, while the formed elements of the blood, the plasma proteins, protein-bound substances and bacteria do not.

HISTORY OF DEVELOPMENT.

Abel, Rowntree and Turner in 1913 coined the term "artificial kidney", using collodion as a membrane and hirudin as an anticoagulant. They showed that salicylates could be removed from the blood. However, it was not until the 1940's that the development of "Cellophane" and heparin provided a commercially available membrane and a relatively safe anticoagulant.

Kolff performed the first successful clinical dialysis in Holland during the second World War (Kolff, 1944). His rotating drum machine utilized the Archimedean screw principle to propel the blood along the "Cellophane" tube, but had the disadvantage that hæmolysis of the red blood cells and variations in the patient's blood volume were fairly common. However, its efficiency was high. Kolff

later (1956) designed a mass-produced, disposable dialysing unit, which is the type used in this series. Its efficiency compares favourably with other types; it is presterilized and can be assembled rapidly. A fresh coil of "Cellophane" is used for each dialysis.

Technique of Dialysis.

The coil consists of two ten-metre lengths of "Cellophane" tubing with surrounding fibre-glass mesh screens wound in parallel round a metal cylinder. The tubing has a surface area of 18,000 square centimetres. Blood is pumped horizontally through the two "Cellophane" tubes, and the rinsing fluid is pumped vertically through the mesh screen surrounding the "Cellophane". Figure I shows a photograph of the machine in action.

The Bath Fluid.

This approximates to blood plasma in its electrolyte content. The concentration of the constituent ions is as follows:

Na^+	140	mEq/l.
K^+	5	mEq/l.
Ca^{++}	5	mEq/l.
Mg^{++}	1·5	mEq/l.
Cl'	109	mEq/l.
$HCO3'$	36	mEq/l.
Glucose	800	mg. per 100 ml.

Excess glucose is used to offset the osmotic pressure of the serum proteins. Moreover, any absorbed glucose will provide a valuable source of calories to the anuric patient. With a bath glucose level of 800 mg. per 100 ml., the patient's blood sugar level seldom rises to above 400 mg. per 100 ml. during dialysis, and we have not found it necessary to correct this rise with insulin, as has been suggested (Jackson, 1959). Modifications of the standard fluid are made according to the patient's electrolyte pattern, as follows:

1. Potassium. If the serum postassium level is greater than 7 mEq/l., a concentration of 1·8 mEq/l. is used in the first bath fluid.

2. Sodium. Use of the original Kolff rotating drum machine often led to water-absorption by the patient. Serum sodium levels are usually low in anuria, and if normal serum levels of sodium are used in the bath, water retention and pulmonary œdema may occur, as sodium and water will pass from the bath to the patient's blood. On this account, Parsons and McCracken (1958, 1959), using a modified Kolff rotating-drum machine, have recommended that the concentration of sodium in the bath fluid should be the same as that of the patient's plasma. However, with the degree of ultrafiltration possible in the twin-coil dialyser, the risks of water retention are negligible, and we now use a bath level of 140 mEq/l. as a routine.

A mixture of 95% oxygen and 5% carbon dioxide is bubbled in continually to maintain the pH of the bath fluid at approximately 7·40. If the pH rises, calcium in the bath may be precipitated as calcium carbonate.

We use vein-to-vein dialysis as a routine. Blood is taken from the inferior vena cava by cannulating the saphenous vein in the groin, and any convenient arm vein is used for returning blood to the patient.

Alternatively, the radial artery at the wrist can be cannulated; but this is unnecessary with a pump in the circuit, and higher flow rates are usually obtainable from the vena cava (300 to 600 ml. of blood per minute). It requires approximately two bottles of blood (920 ml.) to prime the coil and plastic tubing, immediately prior to commencing dialysis. To lessen the risk of hæmolysis, this blood is preferably not more than 24 hours old; but on several occasions we have used blood taken one week previously, and no demonstrable hæmolysis has occurred.

We have recently on several occasions used a double-lumen cannula (McIntosh *et alii*, 1959), inserted into the vena cava from the saphenous vein, so that blood may be withdrawn from the shorter tube from low in the vena cava or iliac vein, and returned distally into the vena cava just below the diaphragm. Satisfactory clearances of urea have been obtained by the use of this technique, the time required for cannulation is less, and the arm veins are spared.

Heparin is given to the patient initially in a dose of 50 to 100 units per kilogram, and thereafter, an injection of 1000 units is given into the inflow line each hour. The dosage of heparin has been reduced by the use of all-plastic connexions, and during a ten-hour dialysis rarely exceeds 16,000 units. Oozing from the cannulation incisions is very rarely a problem, if the wounds are closed carefully with elimination of all dead space.

Hæmodynamics and Biochemistry of Dialysis.

Dialysis is a relatively safe and effective method of restoring biochemical normality in patients with renal failure. We usually follow changes by estimating the serum electrolyte levels every two hours, and the findings are generally quite predictable.

Blood Urea Level.

This is lowered to a degree dependent on the flow rate, the initial blood urea level, the size of the patient and the duration of dialysis. A reduction of at least 50% is usually obtained. There has been an average fall of 190 mg. per 100 ml. in the blood urea level over a dialysis lasting 8 to 10 hours. Between 100 and 150 grammes of urea will be removed from the patient by a successful dialysis (average 130 grammes).

Other Serum Electrolytes.

The potassium level falls rapidly over the first two hours if low bath levels are used, and thereafter the readings level off towards normal.

Sodium, chloride, bicarbonate and calcium levels revert more slowly to normal values over about six hours. After this time the serum electrolyte levels have invariably reverted to approximately normal, and urea and phosphate levels continue to fall slowly, the decrements over succeeding hours becoming progressively less. We aim at a dialysing time of 10 hours in each case, if possible. The bath fluid is changed every two or three hours, as this has been shown to increase the efficiency of dialysis by as much as 20% (Wolff *et alii*, 1951).

The biochemical improvement achieved by a ten-hour dialysis is shown in Table I (Case 21D).

Hazards of and Contraindications to Dialysis.

There are few hazards of and contraindications to dialysis, and no serious complications of dialysis in this series. There were no fatalities attributed to dialysis, although in two cases death occurred during dialysis. Each of these patients was moribund before and during the procedure, and death appeared imminent at any time. There are rarely any subjective discomforts to the patient during the procedure.

Hæmorrhage.

The dosage of heparin required has been reduced with the use of all-plastic kidneys. However, the use of the machine within three or four days of a major surgical operation represents a calculated risk. A bleeding tendency is, of course, common in renal failure, but this in itself is not a contraindication, as it may be reduced by dialysis. One of our patients who succumbed was found at autopsy to have a small subdural hæmatoma, and heparin could not be excluded as the cause.

We have performed dialysis in the presence of continued bleeding from the prostatic bed four days after prostatectomy, without any noticeable increase in bleeding.

In none of the other cases was hæmorrhage a problem, and it is thought that heparin in the dosage used is safe and effective for the vast majority of patients requiring dialysis.

When the risk of systemic heparinization is considered to be very great, techniques of regional heparinization have been described (Gordon, Richards *et alii*, 1956; Gordon, Simon *et alii* 1956; Anderson and Kolff, 1959).

We have not yet considered this necessary, and have dialysed one patient suffering from acute glomerulonephritis, in which the dangers of hæmorrhage are said to be high, with no sequelæ.

TABLE I.

Biochemical Effect of Dialysis in Case 21D.

	Prior to Dialysis.	Conclusion of Dialysis.	24 Hours Later.
Na^+	150 mEq/l.	140 mEq/l.	143 mEq/l.
K^+	6·3 mEq/l.	4·3 mEq/l.	6·0 mEq/l.
Ca^{++}	4·2 mEq/l.	5·9 mEq/l.	— mEq/l.
Mg^{++}	4·28 mEq/l.	3·90 mEq/l.	3·50 mEq/l.
Cl^-	110 mEq/l.	99 mEq/l.	99 mEq/l.
HCO_3^-	3 mEq/l.	21 mEq/l.	19 mEq/l.
Protein	17 mEq/l.	18 mEq/l.	19 mEq/l.
$PO_4^{'''}$	7·7 mEq/l.	4·2 mEq/l.	6·0 mEq/l.
pH	7·05	7·33	7·31
Hæmatocrit	28%	31%	34%
Blood sugar level ..	115 mg. per 100 ml.	430 mg. per 100 ml.	115 mg. per 100 ml.
Blood urea level ..	450 mg. per 100 ml.	150 mg. per 100 ml.	195 mg. per 100 ml.

Changes in Blood Constituents.

Transient thrombocytopenia may be seen during dialysis, probably owing to platelets adhering to the "Cellophane" membrane. Platelet levels may fall from 250,000 or 300,000 per cubic millimetre before dialysis to a level of 100,000 or so after dialysis, but there is a rapid return to the previous values over the succeeding 48 hours. Recognizable hæmolysis has not occurred in any patient.

Blood-Pressure Changes.

On most occasions, the blood pressure does not alter significantly; but a rise in systolic and diastolic blood pressure of approximately 20 to 30 mm. of mercury is sometimes seen after about an hour's dialysis. Only on one occasion has it required the use of a hypotensive agent ("Ansolysen") for control. This rise is said to be more common with high flow rates (Kolff, 1957), but this relation has not been noted in our series. A fall in blood pressure is uncommon, and occurred in only one case early in the series, when oozing from the cannulation incision was excessive. Blood transfusion will rapidly restore the *status quo*.

Difficulties with Blood Flow.

At high flow rates, the wall of the inferior vena cava may be sucked against the opening of the cannula, and cause valve-like interference with flow and collapse of the tubing proximal to the pump. This is more common when the artery is used, and may rarely cause annoying limitation of flow to about 250 ml. per minute when the vena cava is used. It has been practically eliminated by the provision of two or three adequate side holes in the cannula.

INDICATIONS FOR DIALYSIS.

Dialysis is not a substitute for conservative management, but is a valuable ancillary, which may

TABLE II.

Acute Renal Failure; No Dialysis.

Case Number.	Diagnosis.	Age. (Years.)	Sex.	Maximum Blood Urea Level (Mg. per 100 ml.).	Maximum Serum Potassium Level. (mEq/l.)	Day of Onset of Diuresis (>1000 ml.).	Extrarenal Lesion (Recoverable or Irrecoverable).	Outcome.
Non-fatal cases (5):								
				Pregnancy.				
3N	Septic abortion (*Clostridium welchii*).	35	F.	490	6·2	20	—	Recovery, no sequelæ; discharged 32nd day.
				Post-operative or Post-traumatic Causes.				
20N	Appendicectomy; peritonitis and wound abscess.	55	M.	170	5·5	5	—	Recovery, no sequelæ; discharged 18th day.
				Incompatible Transfusion.				
30N	Recurrent hæmatemeses; ? peptic ulcer; incompatible transfusion (Kell).	57	F.	300	7·6	12	—	Recovery, no sequelæ; discharged 18th day.
				Other Causes.				
17N	? Dehydration due to enterocolitis.	54	M.	Not forwarded from referring hospital.		6	—	Recovery, no sequelæ; discharged 13th day.
19N	Gas gangrene of buttock after injection of adrenalin-in-oil.	43	M.	360	7·2	5	—	Recovery, no sequelæ; discharged 25th day.
Deaths (18):								
				Pregnancy.				
27N	Post-partum rupture of uterus — streptococcal septicæmia.	32	F.	190	5·5	—	Irrecoverable.	Death 36 hours after onset of oliguria.
				Post-traumatic or Post-operative Causes.				
6N	Carcinoma of rectum, anterior resection: disruption of anastomosis; bleeding tendency.	30	F.	375	7·1	4	? Recoverable.	Death on 26th day.
8N	Obstructive jaundice, stone in common bile duct; post-operative hepatic failure.	60	F.	75	6·5	—	Irrecoverable.	Death on 10th day.
9N	Stove-in-chest injury; hæmopneumothorax; ruptured kidney; fractured forearm.	65	M.	290	9·0	—	Irrecoverable.	Death on 11th day, 3 hours after transfer.
10N	Traumatic rupture of kidney and pancreas; pancreatic fistula and abscess; burst abdomen; bronchopneumonia.	40	M.	475	6·9	12	? Recoverable.	Death on 16th day.

TABLE II.—*Continued.*
Acute Renal Failure; No Dialysis.—Continued.

Case Number.	Diagnosis.	Age. (Years.)	Sex.	Maximum Blood Urea Level (Mg. per 100 ml.).	Maximum Serum Potassium Level. (mEq/l.)	Day of Onset of Diuresis (>1000 ml.).	Extrarenal Lesion (Recoverable or Irrecoverable).	Outcome.
22N	Recurrent carcinoma colon—fæcal fistula.	70	F.	390	6·8	—	Irrecoverable.	Death on 8th day.
23N	Ulcerative colitis, carcinoma of colon; colectomy, ileostomy; post-operative hæmorrhage; pelvic abscess; cystic disease of renal pyramids (sponge kidney).	40	M.	280	7·0	—	Irrecoverable.	Death on 10th day, 12 hours after transfer.
25N	Nephrolithiasis right kidney; right nephrectomy; post-operative renal failure; left nephrostomy.	65	M.	220	7·9	—	? Recoverable.	Death on 5th day 12 hours after transfer.
35N	Acute cholecystitis; choledocholithiasis; cholecystectomy; post-operative pancreatitis.	57	F.	360	6·0	17	Recoverable.	Death on 19th day.
				Staphylococcal Septicæmia.				
5N	Staphylococca septicæmia; suppurative pericarditis; metastatic abscesses; circulatory failure.	62	M.	Not forwarded from referring hospital.			Irrecoverable.	Death 15 minutes after admission.
33N	Staphylococcal septicæmia after injection for coccydynia.	23	F.	300	5·4	—	Irrecoverable.	Death on 10th day.
36N	Plating of fractured femoral neck; post-operative septicæmia.	80	F.	350	6·5	—	Irrecoverable.	Death on 10th day.
				Other Causes.				
7N	Carcinoma of lung.	86	M.	250	7·0	8	Irrecoverable.	Death on 30th day.
15N	Bronchopneumonia; circulatory failure.	78	M.	210	9·0	—	Irrecoverable.	Death on 10th day.
17N	Carcinoma of cervix, abdominal metastases; obstructive anuria.	48	F.	165	8·6	—	Irrecoverable.	Death on 3rd day.
28N	Cerebral hæmorrhage.	55	M.	280	6·0	—	Irrecoverable.	Death on 5th day.
31N	Barbiturate overdosage; circulatory failure.	34	M.	245	5·8	—	Irrecoverable.	Death on 18th day.
37N	? Enterocolitis — circulatory failure.	62	M.	270	4·5	—	Irrecoverable.	Death on 3rd day, 1 hour after admission.

be life-saving. Indications for its use are clinical and biochemical.

Clinical Indications.

Clinical indications that the need for dialysis is imminent are difficult to define with precision. In general, if a patient has symptoms attributable to renal failure, which are progressing despite conservative management over one or two days, then dialysis should be performed. Common manifestations are twitching of the face and limbs, hiccup, increasing mental confusion and restlessness, nausea and vomiting, and Kussmaul breathing. Over-hydration and œdema, peripheral or pulmonary, may be pressing indications in patients who have previously received excess fluid.

If dialysis is delayed until stupor or coma has supervened, the condition may be irreversible. The timing of dialysis is thus preferably early in the course of the illness. However, it should be noted that the beneficial effect of dialysis is due to the correction of an electrolyte imbalance and to the removal of excess water from the patient, and if neither is present, the patient is unlikely to be much improved. If diuresis has not occurred after seven to 10 days in a patient with acute renal failure, clinical deterioration may follow. Before an irreversible stage is reached, the physician in charge should consider the likelihood of dialysis being required, so that transfer to the nearest unit can be arranged if necessary.

Renal failure following trauma or operation follows no set rules, and deterioration may be rapid. Transfer of these patients should be early if the mortality is to be lowered. In exceptional circumstances, the twin-coil machine can be moved to the patient (Jackson, 1958; Honey and Jackson, 1959).

In a scattered community such as ours, artificial kidney units would tend to be situated in the larger centres. Some of the experiences of the units in Brisbane and Sydney have been detailed previously (Dique, 1957; Edwards and Whyte, 1959).

Clinical indications for dialysis are considered to be more important than biochemical indications.

Biochemical Indications.

Each of the following levels is considered to be an indication for dialysis in its own right.

1. A blood urea level greater than 400 mg. per 100 ml. In practice this blood urea level is almost always associated with concomitant clinical indications.

2. A serum bicarbonate level less than 12 mEq/l., with associated acidctic breathing. In practice, acidosis of this degree is occasionally amenable to correction by the administration of hypertonic sodium lactate solution (50 to 200 mEq.); but frequently over-hydration, which prohibits the administration of sodium, or some other associated biochemical indication will reinforce the decision to proceed with dialysis.

TABLE III.
Chronic Renal Disease; Dialysis.

Case Number.	Diagnosis.	Age. (Years.)	Sex.	Day after Admission First Dialysis Performed.	Number of Dialyses.	Blood Urea and Potassium Levels. Before Dialysis. Urea. (Mg. per 100 ml.)	Before Dialysis. Potassium. (mEq/l.)	After Dialysis. Urea. (Mg. per 100 ml.)	After Dialysis. Potassium. (mEq/l.)	Duration of Dialysis. (Hours.)	Outcome.	Weights of Kidneys. (Grammes.)
1D	Malignant hypertension; herniorrhaphy—wound infection; post-operative renal failure; pericarditis.	59	M.	2	2	(a) 305	4·3	170	4·8	10	Death on 22nd day.	R. 120 L. 120
						(b) 320	4·7	185	4·9	10		
2D	Subacute glomerulonephritis; herniorrhaphy—wound infection; post-operative renal failure.	60	M.	0	1	320	8·2	150	5·7	10	Death on 20th day.	R. 120 L. 120
3D	Membranous glomerulonephritis; pericarditis, pleural effusions; congestive heart failure.	34	M.	0	1	220	7·5	90	4·5	10	Death on 40th day after discharge from unit.	R. 125 L. 125
5D	Malignant hypertension; acute-on-chronic pyelonephritis; multiple abscesses of kidneys; suppurative pericarditis.	51	F.	0	1	230	6·3	135	4·9	10	Death on 3rd day.	R. 210 L. 210
10D	Prostatomegaly; chronic renal failure; bilateral hydronephrosis and hydroureters; pre-operative hæmodialysis 1st day; prostatectomy 2nd day.	66	M.	0	1	270	5·7	130	4·0	8	Death on 5th post-operative day.	Not recorded.
13D	Chronic nephritis and nephrolithiasis in solitary kidney; nephrolithotomy, nephrostomy; post-operative renal failure; ascending urinary infection; diabetes mellitus.	52	M.	0	1	215	4·5	100	5·4	10	Death on 20th day.	Not recorded.
19D	Malignant hypertension; overdosage of "Ansolysen".	69	F.	0	1	425	6·5	100	4·4	10	Death on 15th day.	No autopsy—renal biopsy.
21D	Chronic pyelonephritis.	23	M.	0	1	450	6·3	150	4·3	10	Death on 10th day.	R. 100 L. 110
22D	Chronic pyelonephritis; prostatomegaly—transurethral prostatectomy; intravascular hæmolysis due to perfusing fluid.	77	M.	1	1	235	2·8	120	4·5	9	Death on 36th post-operative day.	R. 125 L. 125
24D	Malignant hypertension; overdosage of "Ansolysen"; pulmonary œdema.	35	F.	8	1	245	4·2	145	5·1	7	Death on 22nd day.	R. 120 L. 120
25D	Subacute nephritis; subendocardial fibrosis; bronchopneumonia.	47	M.	0	1	455	4·2	215	4·1	8	Death on 2nd day, 24 hours after dialysis.	R. 240 L. 240
27D	Polycystic disease of kidneys, polycystic liver.	49	M.	5	1	290	4·5	130	3·8	9	Discharged on 28th day; death in renal failure six weeks later.	R. 1500 L. 1160
28D	Malignant hypertension.	45	F.	2	1	270	7·4	80	5·0	8	Death on 14th day.	Not recorded.

3. A serum potassium level greater than 7·2 mEq/l., uncontrolled by conservative measures. These may be one or more of the following (Meroney and Herndon, 1954): the administration of hypertonic glucose solution with insulin, hypertonic sodium solutions, calcium gluconate, cation-exchange resins, and the packed hypopotassæmic red cells from old blood. In practice, potassium intoxication can often be controlled by conservative measures without the need for dialysis. However, hyperpotassæmia may dominate the course of the disease, especially in post-operative and post-traumatic renal failure. In these cases manifestations of potassium intoxication may develop after two or three days of anuria despite adequate treatment, and dialysis will be necessary. Dialysis is an extremely effective means of lowering potassium levels, but the effect may be transitory if tissue destruction is a feature, and a rapid rise after dialysis may necessitate a further dialysis within a few days.

THE EFFECTS OF DIALYSIS.

Dialysis can be relied upon to produce a clinical and biochemical improvement in a patient who is severely ill from acute renal failure.

In favourable cases, dialysis will change a protracted and severe illness, in which survival is in some doubt, into an infinitely easier medical and nursing problem, in which recovery is not in question.

Some improvement, especially the relief of dyspnœa from acidotic breathing, may occur clinically during the course of dialysis. However, clinical improvement is most marked about 24 hours after the completion of dialysis,

TABLE IV.

Group III; Acute Oliguric Renal Failure; Dialysis.

Case Number.	Diagnosis.	Age. (Years.)	Sex.	Days of Oliguria Prior to		Number of Dialyses.	Blood Urea and Potassium Levels.				Days of Oliguria Prior to Diuresis. (1000 ml.)	Outcome.	Extra-renal Lesion: Recoverable or Irrecoverable.	Duration of Dialysis. (Hours.)	Total Heparin Dosage. (Units.)
							Before Dialysis.		After Dialysis.						
				Admission to Hospital.	First Dialysis.		Urea. (Mg. per 100 ml.)	Potassium. (mEq/l.)	Urea. (Mg. per 100 ml.)	Potassium. (mEq/l.)					
Non-fatal cases (9):															
							Pregnancy.								
18D	Septic abortion, *Cl. welchii*.	32	F.	15	15	1	355	6·0	95	5·1	20	Recovery, no sequelæ; discharged on 40th day.	—	10	19,000
29D	Septic abortion, *Cl. welchii*.	23	F.	13	14	1	380	5·8	90	4·7	21	Recovery, no sequelæ; discharged on 34th day.	—	10	14,000
26D	Eclampsia, subarachnoid hæmorrhage.	38	F.	1	11	2	(*a*) 305 (*b*) 250	3·5 4·1	100 120	3·9 4·1	30	Recovery, no sequelæ; discharged on 47th day.	— —	8 7	12,000 12,000
							Post-Operative and Post-Traumatic.								
16D	Hydronephrosis in solitary kidney; pyeloplasty (Culp); post-operative renal failure.	16	M.	Diuresis in admission on 15th day.		1	345	6·2	155	4·8	14	Recovery, no sequelæ; discharged on 34th day.	—	10	16,000
							Incompatible Transfusion.								
6D	Incompatible transfusion.	41	F.	6	11	1	390	7·1	180	4·8	10	Recovery, no sequelæ; discharged on 30th day.	—	10	16,000
							Staphylococcal Septicæmia.								
9D	Breast abscess, staphylococcal septicæmia.	32	F.	4	5	1	390	5·2	90	4·7	10	Recovery, no sequelæ; discharged on 14th day.	—	10	16,000
							Other Causes.								
7D	Hydronephrotic stricture, obstructive anuria; pyelostomy on 6th day; pre-operative dialysis on 33rd day; pyeloplasty on 34th day.	54	F.	6	—	1	100	4·6	40	4·9	6	Recovery, no sequelæ; discharged on 55th day.	—	8	13,000
4D	Acute glomerulonephritis.	13	M.	7	7	1	425	6·9	150	6·1	10	Recovery, no sequelæ; discharged on 42nd day.	—	10	18,000
32D	Discrogram precipitating status epilepticus; renal failure; myocardial infarction.	49	M.	4	5	2	(*a*) 205 (*b*) 310	7·1 3·7	130 115	4·5 3·9	21	Recovery, no sequelæ; discharged on 35th day.	— —	5 9	13,000 17,000
Deaths (11):															
							Post-Operative and Post-Traumatic Causes.								
11D	35% burns; perforated Curling's ulcer.	7	F.	0	5	1	410	7·0	—	—	6	Death on 6th day; dialysis abandoned after three hours because of peripheral failure.	Irrecoverable.	3	—
12D	Varicose veins stripping; ? post-operative Friedländer's bacillus septicæmia.	60	F.	10	11	1	380	5·3	100	4·2	11	Death on 20th day—massive pulmonary embolus.	Recoverable.	8	12,000
15D	Acute pancreatitis, acute cholecystitis; cholecystostomy; post-operative circulatory failure.	65	F.	6	10	1	490	9·1	410	6·6	—	Death on 10th day during dialysis after 2 hours.	Recoverable.	2	—
17D	Multiple injuries.	38	M.	3	3	1	190	9·0	105	5·0	—	Death on 3rd day, 3 hours after dialysis.	? Recoverable.	2	10,000
20D	Transurethral prostatectomy; intravascular hæmolysis due to perfusing fluid; acute pyelonephritis; multiple kidney abscesses; suppurative epididymo-orchitis.	62	M.	8	9	1	290	6·2	135	5·2	15	Death on 28th day from secondary infection.	Irrecoverable.	7	13,000
23D	Spontaneous rupture of œsophagus; post-operative renal failure; mediastinal abscess.	59	M.	4	8	1	330	6·5	150	5·1	—	Death on 12th day—leakage at suture line.	Irrecoverable.	8	16,000

TABLE IV.—*Continued.*

Group III: Acute Oliguric Renal Failure: Dialysis.—Continued.

TABLE IV.—*Continued.*

Group III: Acute Oliguric Renal Failure; : Dialysis.—Continued.

Case Number.	Diagnosis.	Age. (Years.)	Sex.	Days of Oliguria Prior to		Number of Dialyses.	Blood Urea and Potassium Levels.				Days of Oliguria Prior to Diuresis. (1000 ml.)	Outcome.	Extra-renal Lesion: Recoverable or Irrecoverable.	Duration of Dialysis. (Hours.)	Total Heparin Dosage. (Units.)
				Admission to Hospital.	First Dialysis.		Before Dialysis.		After Dialysis.						
							Urea. (Mg. per 100 ml.)	Potassium. (mEq/l.)	Urea. (Mg. per 100 ml.)	Potassium. (mEq/l.)					
30D	75% Burns.	22	M.	6	7	1	250	7·0	110	6·1	—	Death on 8th day.	Irrecoverable.	8	13,000
31D	Perforated peptic ulcer; post-operative bowel obstruction; ? septicæmia.	34	M.	9	10	1	165	—	—	—	—	Death on 10th day during dialysis.	Irrecoverable.	6	10,000
34D	Suprapubic prostatectomy; intravascular hemolysis, due to bladder washout; wound disruption; bronchopneumonia.	63	M.	4	4 15	3	(*a*) 230 (*b*) 300 (*c*) 390	5·7 4·8 3·9	85 120 130	5·2 4·3 5·0	—	Death on 49th day.	? Recoverable.	10 8 7	14,000 13,000 12,000
							Other Causes.								
14D	Acute hemolytic anæmia.	63	F.	9	9	1	410	5·8	230	4·3	—	Death on 10th day.	Irrecoverable.	7	13,000
33D	Carcinoma of prostate, metastases to lymph nodes, adrenals, vertebræ, left kidney, involvement of ureters and trigone.	68	M.	2	12	2	(*a*) 255 (*b*) 285	3·3 4·1	160 145	3·7 4·3	—	Death on 33rd day.	Irrecoverable.	7 7	14,000 13,000
23D	Spontaneous rupture of œsophagus; post-operative renal failure; mediastinal abscess.	59	M.	4	8	1	330	6·5	150	5·1	—	Death on 12th day—leakage at suture line.	Irrecoverable.	8	16,000

and may very often be striking. A comatose patient may be restored to lucidity, and an increase in appetite replaces intractable nausea and hiccup. Although most patients with twitching improve slightly during dialysis, we have noted on several occasions an increase in twitching and restlessness during dialysis, a happening which has also been recorded by other workers (Parsons and McCracken, 1959).

In patients with chronic renal disease, clinical improvement is slower to occur, less dramatic and often absent. After a dialysis performed for acute renal failure, if diuresis does not occur, a remission of about seven to 10 days is usually gained. At the end of this period the reappearance of symptoms may necessitate a further dialysis.

Dialysis does not seem to delay or to accelerate the onset of diuresis; nor would one expect it to do so, for diuresis is an index only of the natural recovery of the renal lesion.

TABLE V.

Tabulation of Results in 71 Cases of Renal Failure.

	Number of Patients.	Number Dialysed.	Number Surviving.
Group I: Chronic renal disease ..	27	13	2
Group II: Hepatic failure ..	1	1	0
Group III: Acute renal failure:			
(*a*) Pregnancy	5	3	4
(*b*) Post-traumatic and post-operative causes	19	10	2
(*c*) Incompatible transfusion ..	2	1	2
(*d*) Staphylococcal septicæmia ..	4	1	1
(*e*) Other causes	13	5	5
Total	43	20	14

The presence of diuresis should not influence the decision to proceed with dialysis, if clinical or biochemical indications are present.

Sudden deterioration and death can occur in the presence of satisfactory diuresis, and recovery is more certain when aided by the clinical benefit conferred by dialysis. On this account, also, it is to be noted that even satisfactory diuresis will not cause a fall in the blood urea level until several days have elapsed, and clinical improvement is usually delayed until this fall occurs.

RESULTS OF DIALYSIS.

The patients in this series represent 18 months' experience with the use of the artificial kidney at the Alfred Hospital. There have been 71 patients referred to the unit for consideration of dialysis, and of these 34 have come to dialysis.

One patient was dialysed on three occasions, and four patients received two dialyses, making a total of 40 dialyses on 34 patients.

Patients Admitted, who did not Come to Dialysis (37).

As this is the only dialysing unit in Victoria, it was natural that a varied collection of patients should be referred, in the treatment of many of whom dialysis had little or no place. Many patients were in terminal renal failure due to chronic renal disease, and several had developed acute renal failure as a complication of a fatal extrarenal lesion, such as widespread intraabdominal carcinoma, hepatic failure, staphylococcal septicæmia and irreversible hypovolæmic shock from multiple injuries.

Group I: Chronic Renal Disease.

There were 14 patients with chronic renal disease, most of whom presented in a terminal stage with renal failure. The ages of the patients ranged from 14 to 88 years. Of these two patients are surviving, one with chronic

nephritis, and one with recurrent nephrolithiasis. Of the remaining 12 patients, five were suffering from chronic nephritis, four from chronic pyelonephritis, one from subacute nephritis, one from disseminated lupus erythematosus and one from nephrosclerosis.

Surgery precipitated renal failure in two of these cases, and in both no previous clinical evidence of chronic renal disease was obtained. The operations were a prostatectomy upon a man of 74 years (chronic pyelonephritis), and the removal of a sigmoid colon carcinoma from a woman of 88 years (nephrosclerosis).

It is not proposed to consider this group further in this paper.

Group II: Acute Renal Failure.

The details of these 23 patients are shown in Table II.

In considering the patients who died (18 out of 23), it is seen that in the majority the extrarenal lesion was

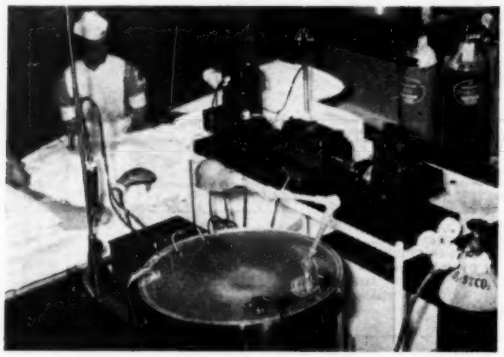

FIGURE I.
Photograph of the Kolff artificial kidney in use.

the main cause of death. It is not believed that dialysis could have altered the outcome except in Cases 6N, 10N, 25N and 35N (Table II). In these, although the severity of the contributing cause made the outcome doubtful, dialysis might have been of benefit, but was not performed. In three of the patients who presented early in our study (Cases 6N, 10N and 25N), the risk of dialysis was considered at that stage of our experience to be too great, because of a recent major operation or the presence of a severe bleeding tendency.

In one case (Case 25N) a nephrostomy was performed 24 hours before the patient's admission to the unit. This was on his sole remaining kidney, and the risks of hæmorrhage were considered too great for immediate dialysis. However, his rapid clinical deterioration over the following 12 hours made dialysis mandatory. Unfortunately death occurred before this could be instituted.

Patients who Came to Dialysis (34).

Experience was gained initially on patients who were believed to have hopelessly irreversible and terminal renal failure. Although striking biochemical and clinical remissions were invariably obtained, in each of the 13 patients in this group relapse eventually occurred with a fatal outcome, the longest remission being for ten weeks. At the present stage of our experience, few of these patients would now be submitted to dialysis.

Group I: Chronic Renal Disease With or Without an Acute Exacerbation.

The details of these 13 patients are given in Table III.

If chronic renal disease can be diagnosed with certainty, dialysis is not performed, as the dividend is negligible. Unfortunately, irreversible renal disease can rarely be predicted before autopsy, and undoubtedly we shall continue to have disappointments with this group of patients.

In many instances, when one is faced with a gravely ill patient with obviously severe and apparently acute renal failure, dialysis must be performed in order that a diagnosis can be made after improvement of the clinical state.

Recently we were presented with the problem of a young man admitted from a country hospital (Case 21D). He was stuporose and grossly acidotic, and very little history was obtainable. Although an acute exacerbation of chronic nephritis seemed likely, dialysis was performed forthwith because of the uncertainty of diagnosis. He regained consciousness after this, and further investigation was possible to confirm the diagnosis of chronic renal disease. His subsequent decline was rapid (Figure I), and autopsy revealed shrunken granular kidneys. Microscopic examination of sections of these showed chronic pyelonephritis with few remaining normal glomeruli.

Chronic renal disease may be suspected if a long history of recurrent urinary tract infections is present. Other features, such as muscle cramps, general malaise, hypertension of significant degree and long-standing retinal changes, are suggestive, but may very often be absent.

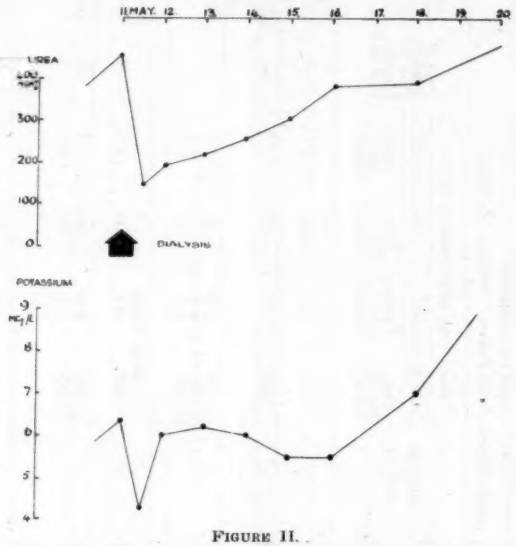

FIGURE II.
CASE 21D: Course of renal failure in a patient with an acute exacerbation of chronic renal disease.

Laboratory tests may reveal a normochromic anæmia, and the urea and phosphate levels may be elevated to a greater degree than is suspected from the length of the acute history. A plain film of the renal tract may show the kidneys to be of small size, but in severely ill and acidotic patients, adequate X-ray examination may be impossible, as respiratory movements cannot be controlled.

Percutaneous renal biopsy is probably the most valuable of all aids in determining chronicity. Usually the risks of hæmorrhage in a case of severe renal failure will preclude an immediate biopsy, but 24 hours after the conclusion of a dialysis the clinical and biochemical improvement is often such that biopsy may be performed. If chronic renal disease is shown, no further dialyses are done.

CASE 28D.—A woman, aged 45 years, with a past history of recurrent abdominal pain, was admitted to hospital with a recent exacerbation of the pain, vomiting of five days' duration with some blood in the vomitus, and oliguria of two days' duration. On examination, she was extremely ill, with acidotic respirations. The blood pressure was 250/140 mm. of mercury, and the hæmoglobin value was 8·5 grammes per 100 ml. Examination of the fundi showed papilledema and vessel changes. There was albuminuria, and the serum electrolyte levels were as follows: potassium, 7·4 mEq/l.; bicarbonate, 11 mEq/l.; urea, 270 mg. per 100 ml.

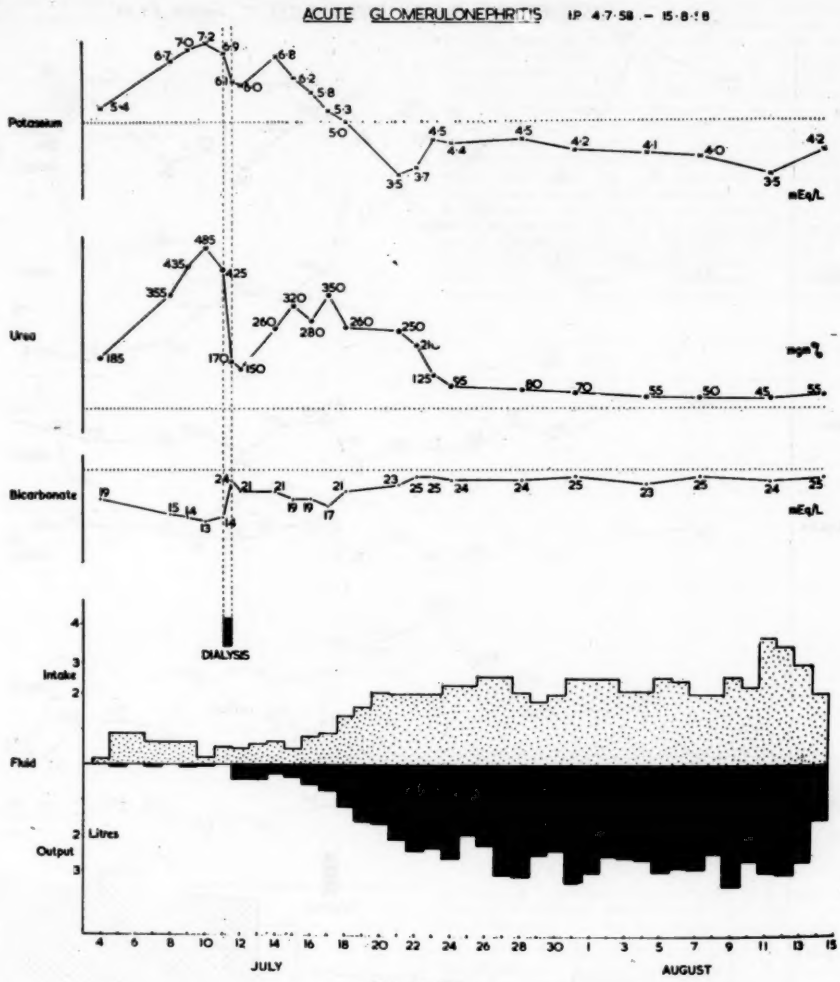

FIGURE III.

CASE 4D: The course of renal failure in Case 4D (acute glomerulitis). Potassium, urea, bicarbonate and fluid balance.

It seemed likely that the patient was suffering from malignant hypertension in the terminal phase, and that dialysis would be of no avail. However, in view of her youth and previous good health, it was planned to perform a renal biopsy, but the risk was considered to be too great in view of her clinical state, the elevated blood urea level and the presence of a bleeding tendency. Hæmodialysis was performed uneventfully on the following day. An eight-hour dialysis caused clinical and biochemical improvement, the serum electrolyte levels at the conclusion of dialysis being as follows: potassium, 5·0 mEq/l.; bicarbonate, 21 mEq/l.; urea, 80 mg. per 100 ml. A percutaneous renal biopsy was performed without complication 18 hours after the conclusion of dialysis, and showed appearances consistent with severe malignant hypertension. Despite treatment, her subsequent downhill course was rapid, and she succumbed 12 days later. The diagnosis was confirmed at autopsy.

Group II: Hepatic Failure.

Dialysis was performed on one patient with hepatic coma from chronic alcoholic hepatitis, with no alteration in the clinical course. The blood ammonia and bilirubin levels were not altered significantly by dialysis.

Group III: Acute Oliguric Renal Failure.

The details of these 20 patients are recorded in Table IV.

Summary of Results.

The results of treatment of the 71 patients are summarized in Table V.

REPORTS OF CASES.

Some illustrative case reports follow.

CASE 4D.—A boy, aged 13 years, suffering from acute glomerulonephritis, presented with a five-day history of sore throat, malaise and vomiting. Hæmaturia was noted for two days prior to his admission to hospital on July 4, 1958. He was pale, with subsiding pharyngitis, and examination of the urine showed many erythrocytes, some polymorphs and many granular casts. He was oliguric from his admission to hospital, with progressive deterioration, mental confusion and drowsiness and intractable vomiting. The blood urea level was 425 mg. per 100 ml., and the serum potassium level 7·2 mEq/l. There was a striking improvement after dialysis on the eighth day of oliguria (July 11); his urinary output increased and he made an uneventful recovery (Figure II). Twelve months later he was in excellent health, with no evidence of impaired renal function.

Before dialysis was performed, this patient was critically ill, whereas after dialysis recovery was not at any stage in question. It is considered that dialysis in acute glomerulonephritis with renal failure should be performed

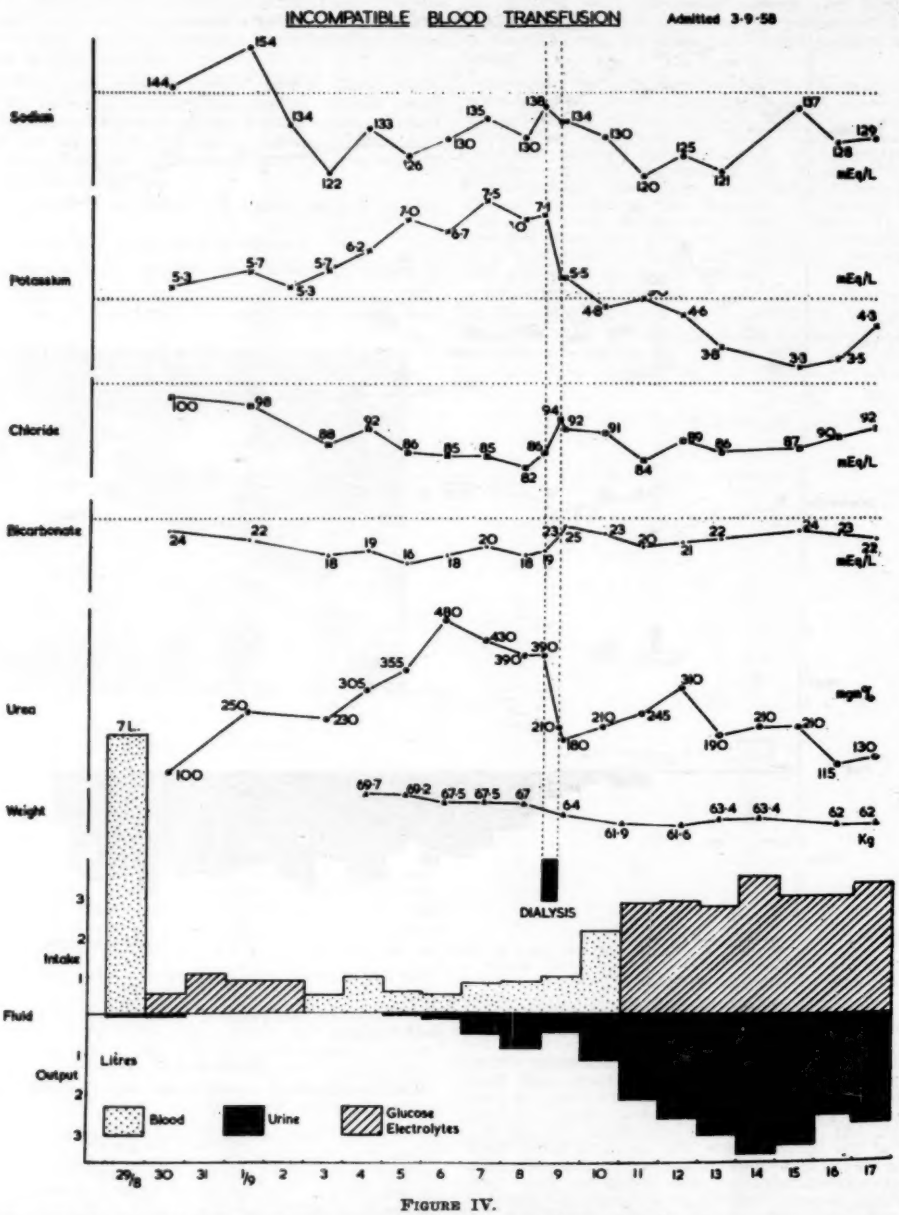

FIGURE IV.

The course of renal failure in Case 6D (incompatible transfusion). Sodium, potassium, chloride, bicarbonate, urea, weight and fluid balance.

when life is threatened on clinical or biochemical grounds. Dialysis in this instance was uneventful, but earlier workers (Derow, 1953) have reported that occasionally convulsions, heart failure and hæmorrhage have followed dialysis in patients with acute glomerulonephritis.

CASE 6D.—A female patient, aged 41 years, had been given an incompatible transfusion. This woman had had seven previous pregnancies, with four living children and three fœtal deaths in utero. She became pregnant again and was delivered of a macerated fœtus on August 28, 1958. There was a massive post-partum hæmorrhage, and failure of the blood to clot was noted. Her blood group was believed to be O, Rh-positive, and she was given 14 bottles (6·5 litres) of Group O Rh-positive blood without cross-matching, and also fibrinogen intravenously. Profound hypotension continued throughout this period, but after six hours the bleeding stopped. At this time she was noticed to be jaundiced, and free hæmoglobin was present in the urine. She was severely oliguric from then onwards, and was transferred to the unit on September 3. She was jaundiced, the hæmoglobin value was 6·5 grammes per 100 ml. and the jugular venous pressure was elevated. Her blood group was checked and found to be O, Rh-negative. She was given a slow transfusion of Group O, Rh-negative packed cells, and continued on a caval infusion of 50% glucose solution. Despite an increasing urinary output her condition deteriorated, with mental confusion, continued vomiting and acidotic breathing. The blood urea level was over 400 mg. per 100 ml., and the serum potassium level was 7·1 mEq/l.

Dialysis was performed on September 8, and caused a striking clinical and biochemical improvement (Figure III). She subsequently made an uneventful recovery.

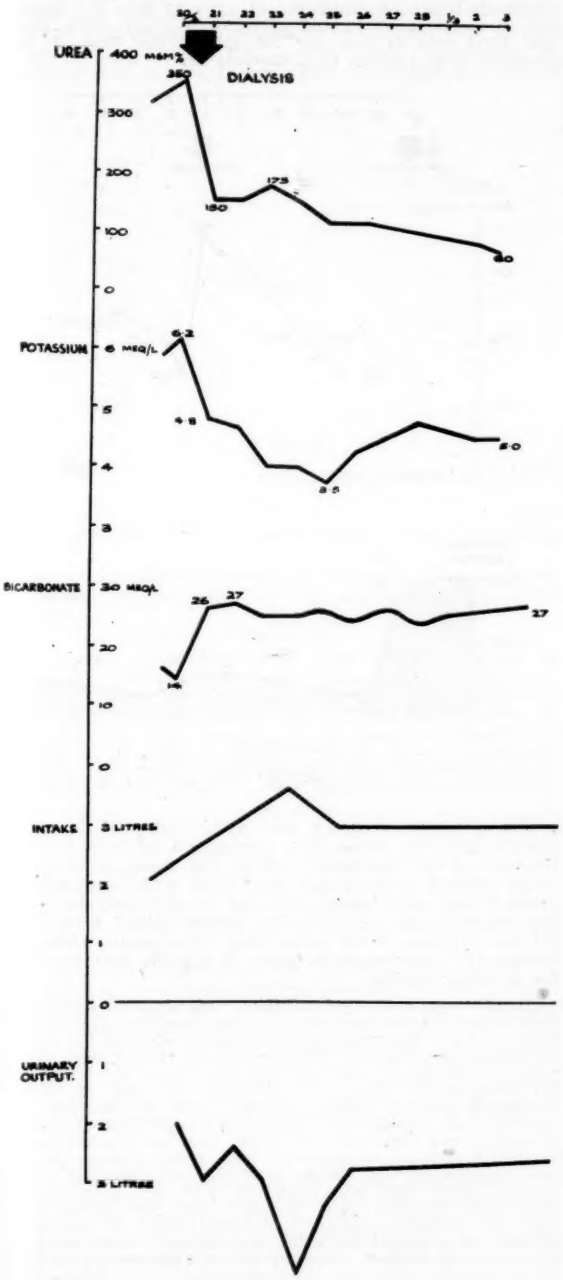

FIGURE V.

The course of renal failure in Case 16D (hydronephrosis, post-operative renal failure). Urea, potassium, bicarbonate and fluid balance.

Dialysis may be required, as in this case, in the early diuretic phase, because of continued clinical or biochemical deterioration.

CASE 16D.—This boy, aged 16 years, was suffering from hydronephrosis and post-operative renal failure. He had a history of 10 years' intermittent pain beneath the left costal margin, with loss of one stone in weight over the previous month. There were no urinary symptoms, but pyelography showed no evidence of a right kidney or ureter, and the presence of a left hydronephrosis with a stricture at the pelvi-ureteric junction. He was anæmic, and his blood pressure was 140/100 mm. of mercury. There was tenderness beneath the left costal margin, and urine examination showed a mixed flora of organisms. His blood urea level was 50 mg. per 100 ml., and the hæmoglobin value was raised to 13 grammes per 100 ml. by pre-operative transfusion. On February 5, 1959, a left pyeloplasty (Culp) was performed on the stricture, and the pelvis was drained by a tube brought out through the kidney substance. After operation his progress was satisfactory until the sixth day, when he developed a secondary hæmorrhage from the nephrostomy tube, requiring transfusion. Despite an

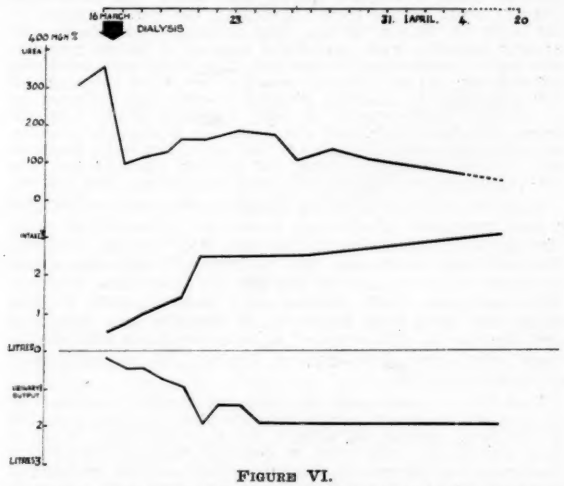

FIGURE VI.

The course of renal failure in Case 18D (septic abortion). Urea and fluid balance.

increasing urinary output from the nephrostomy tube, his clinical condition deteriorated over the following week, and on February 17 he developed Jacksonian convulsions.

On his admission to the unit on February 20, he was unconscious, with generalized twitching and acidotic respirations; the blood pressure was 180/130 mm. of mercury, and the blood urea level was 350 mg. per 100 ml. Dialysis was performed on February 21, and was followed by gratifying improvement in his conscious state over the succeeding twenty-four hours, and a good biochemical remission (Figure IV). His progress thereafter was rapid, and five months later he was in excellent health, with reduction of the hydronephrosis and good drainage of the pelvis shown by pyelography; the blood urea level was 30 mg. per 100 ml., and his surgeon stated that he was with difficulty restrained from playing football.

This patient was improved by dialysis, and his rapid deterioration prior to this, despite an adequate urinary output, emphasizes the danger of postponing dialysis if diuresis is beginning.

CASE 17D.—A man, aged 38 years, was crushed between a truck and a grader on March 10, 1959, sustaining a grossly comminuted fracture of the pelvis, rupture of the left external iliac artery and vein, and a compound fracture of the right ulna. His admission to hospital was delayed until several hours after the accident, and on admission his blood pressure was unrecordable and remained low for a further three hours despite energetic resuscitation. At operation the severed artery was anastomosed and the vein was ligated. After operation he was oliguric (less than 200 ml. of urine per day) and dyspnœic, with mental confusion and extreme muscle weakness. His leg became gangrenous below the mid-calf level. There were petechial hæmorrhages over his scapulæ. The serum potassium level increased steadily, and on March 13 it was 9·0 mEq/l.

At this stage the dyspnœa increased suddenly owing to complete collapse of the right lung. Despite bronchoscopy prior to dialysis, the dyspnœa and cyanosis were not relieved, and tracheostomy was necessary during dialysis, when a large bronchial cast was aspirated. The serum potassium level was reduced to 5 mEq/l. by two hours' dialysis, but death occurred several hours after the completion of dialysis. An autopsy could not be obtained.

This patient had potentially reversible renal failure; but the severity of his associated injuries and the presence of pulmonary collapse, and possible fat embolism, made success unlikely. Tracheostomy during dialysis was difficult because of heparinization, and in retrospect it would have been preferable to establish the tracheostomy and perform an efficient bronchial toilet several hours before dialysis.

CASE 18D.—A married woman, aged 32 years, had herself induced a septic abortion on March 1, 1959. *Cl. welchii* was isolated from a vaginal smear, and there was increasing oliguric renal failure from the outset. On her admission to the unit on March 16 she was stuporose, irrational and grossly acidotic, with peripheral œdema, a sacral pressure sore and a pericardiac friction rub. The blood urea level was 335 mg. per 100 ml. Dialysis was performed on the night of her admission to hospital (Figure V) and was followed by a striking improvement in her conscious state. Diuresis began five days later, and she gradually improved, progress being impeded only by the slow healing of her large pressure sore. On her discharge from the unit on April 25 she was very well, and the blood urea level was 40 mg. per 100 ml.

Renal failure complicating pregnancy or abortion carries a good prognosis if adequate treatment is instituted early. The patient's admission to the unit was delayed until the fifteenth day, when she was severely ill and she would probably have succumbed but for an immediate dialysis. With adequate early conservative management dialysis might not have been required. If transfer to a dialysing unit is delayed until stupor has supervened, an irreversible state may have developed—a tragedy in an eminently recoverable lesion.

CASE 23D.—A man, aged 59 years, sustained a spontaneous rupture of the lower part of the œsophagus after ingesting a moderate amount of alcohol on May 25, 1959. After a long ambulance ride from a country hospital, immediate repair of the rupture in the lower third of the œsophagus was performed 18 hours after it had occurred. At this stage pleural soiling was gross, and the patient was hypotensive for several hours despite transfusion and the intravenous administration of noradrenaline. There was post-operative oliguria, with gradually increasing mental confusion and twitching. The blood urea level rose to 350 mg. per 100 ml.; the serum potassium level was 6·5 mEq/l. and the serum bicarbonate level was 15 mEq/l. Dialysis was performed on June 2, with clinical and biochemical improvement (Figure VI), and he appeared to be progressing well, although oliguria continued. He deteriorated suddenly, with increasing dyspnœa, and died on June 7. Autopsy revealed a leakage at the suture line with a mediastinal abscess.

This patient illustrates the difficulties of treatment when the extrarenal causative lesion is severe and persisting. Deterioration and death were due to the extrarenal lesion despite dialysis and a biochemical remission.

CASE 26D.—A married woman, aged 38 years, was delivered of still-born twins on August 15, 1959, and had ante-partum and post-partum eclamptic convulsions. She was hypotensive for several hours after control of the fits by heavy sedation. She was oliguric from the time of delivery, and was transferred to the unit on the following day. At this stage she was comatose, the blood pressure was 130/80 mm. of mercury and the left plantar reflex was extensor in type. Lumbar puncture revealed evenly blood-stained cerebro-spinal fluid with xanthochromic supernatant fluid. Over the succeeding days she remained oliguric, with no clinical improvement, and left hemiparesis became apparent. The first dialysis was performed on August 26, when the blood urea level was 305 mg. per 100 ml. and the phosphate level 8·1 mEq/l. After an eight-hour dialysis the blood urea level was lowered to 100 mg. per 100 ml., and phosphate level to 2·5 mEq/l. She recovered consciousness within 24 hours, but remained oliguric, the urinary output remaining below 30 ml. per day, except for 500 ml. passed on September 7 and 9 (Figure VII).

Clinical and biochemical deterioration, with increasing mental confusion, had occurred over this period, and a second dialysis was performed on September 11. The blood urea level was lowered from 250 to 120 mg. per 100 ml., with great clinical improvement. A percutaneous renal biopsy was done the next day, and showed severe but recovering tubular necrosis.

Diuresis began on September 14, after 30 days of oliguria, and she made a rapid and complete recovery. The blood urea level was 45 mg. per 100 ml. at the time of her discharge from hospital on September 28.

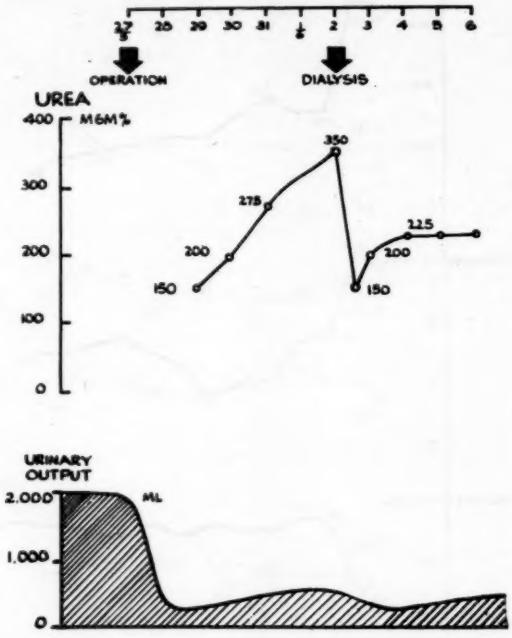

FIGURE VII.
The course of acute renal failure in Case 23D (spontaneous rupture of œsophagus). Urea and urinary output.

This patient's recovery was gratifying, and it seems certain that she would have succumbed without dialysis. Because of the prolonged anuria (30 days), irreversible renal cortical necrosis was considered, and accordingly a renal biopsy was taken after the second dialysis. With the evidence of a recoverable lesion gained from this, further dialyses could have been undertaken with confidence of a favourable outcome if oliguria had persisted for a longer period.

CASE 30D.—A man, aged 22 years, was admitted to hospital on October 7 with deep petrol burns involving 75% of the body surface. The only areas unburned were on the trunk, the groins and the feet. The limbs were treated with closed pressure dressings, and the face and trunk were exposed. He received 12 litres of fluid over the first 48 hours, consisting of blood (half the total), and the remainder as dextrose in saline and serum albumin. He remained conscious and alert for five days, and the blood pressure remained normal throughout. The initial urinary output was between 400 and 600 ml. each day, but complete anuria ensued after four days. On the fifth day *Pseudomonas pyocyanea* infection was apparent over the burnt areas, and the patient's clinical condition began to deteriorate rapidly, with mental confusion and hiccup. It was proposed to perform a dialysis, followed within 24 hours by excision of the infected areas and the application of skin homografts.

Dialysis was performed on the seventh day (October 14), by means of a double-lumen cannula inserted into the saphenous vein. The blood urea level was lowered from 250 to 110 mg. per 100 ml., and the serum potassium level fell from 7·0 to 6·0 mEq/l. His clinical condition remained virtually unchanged, and death occurred on the following day, eight days after the initial burn.

Despite improved resuscitation measures, patients with extensive burns still often die, the major factors being

sepsis, pneumonia and renal failure. The most effective measure against sepsis is early cover of the burnt area with healthy skin, but a patient with progressive renal failure is a poor risk for any lengthy operation. A timely dialysis may enable surgery to be undertaken with greater safety. This patient appeared to have no chance of survival; but it was thought that the experience gained might be helpful on subsequent occasions. The technical difficulties of dialysis may be considerable in these patients.

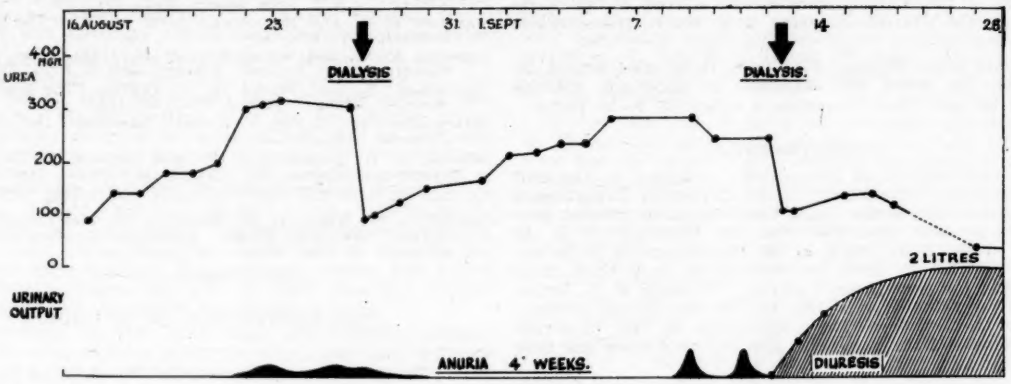

FIGURE VIII.

The course of acute renal failure in Case 26D (eclampsia, subarachnoid hæmorrhage). Urea and urinary output.

DISCUSSION.

A patient presenting with renal failure, which is apparently acute, poses several diagnostic and therapeutic problems. First, an effort must be made to establish the cause of the renal failure, and to determine whether it is in fact an acute episode, or an acute exacerbation of chronic renal disease. Although a reversible precipitating cause, such as an acute urinary tract infection, should in theory be amenable to treatment and a worthwhile remission be obtained in cases of chronic renal damage, it has been seen that in the greater number of cases renal failure developing in the course of chronic renal disease presages a fatal outcome, whether or not dialysis is employed. Of 27 patients admitted to the unit in whom a chronic renal lesion was diagnosed, only two survive. In no case did dialysis produce a worthwhile remission, and it is not recommended.

A possible exception to this is polycystic disease of the kidneys. Our experience is limited to one patient, in apparently terminal renal failure, who was treated by dialysis and a remission was gained; but after his discharge from hospital deterioration occurred, and he died six weeks later in renal failure. As the progress of the disease is very slow, dialysis may be justified, Nakamoto and Kolff (1958) reported eight patients with polycystic disease treated by dialysis; four achieved a worthwhile remission.

In some cases, as has been previously stated, the diagnosis of chronic renal disease is impossible until the clinical condition of the patient has been improved by dialysis, and these patients cannot be refused dialysis. If an irrecoverable lesion is diagnosed within the breathing space allowed by a dialysis, no further dialyses are performed.

If acute renal failure is diagnosed, the renal or extrarenal causative lesion must be recoverable if dialysis is to be worthwhile. The extrarenal lesion is commonly a cause of deterioration and death despite dialysis and biochemical remission. This is particularly so when renal failure follows severe trauma with multiple injuries, or operation, and the mortality in this group is high.

Post-traumatic or post-operative causes accounted for approximately half the cases of acute renal failure (19 of 43), and recovery occurred in only two. In most of the fatal cases the extrarenal lesion was irrecoverable, but it is possible that earlier dialysis may have saved four of the patients who died.

Lesions which offer an excellent prospect of survival are renal failure complicating pregnancy (five cases) and renal failure following incompatible transfusions (two cases). All but one of these patients recovered completely, and there can be little doubt that a dialysis in this group can be life-saving.

Staphylococcal septicæmia, which was proved in four cases and probable in two others, carries a high mortality, as only one patient of these six survived.

Other miscellaneous causes accounted for 13 cases of acute renal failure, and five of these patients survive.

There is thus a total survival rate of 14 patients from 43 with acute renal failure. There were nine survivors from 20 patients treated by dialysis.

Kelemen and Kolff (1958) reported 38 patients with acute renal failure treated by dialysis, 19 of whom recovered. Of 17 patients with post-operative or post-traumatic renal failure, seven recovered. Of six patients who had received an incompatible transfusion, four recovered, and four post-partum patients all recovered.

Parsons and McCracken (1959) described 100 cases of acute renal failure, in 82 of which dialysis was performed. This is in contrast to the 50% or so incidence of dialysis as reported by other workers (Shackman and Milne, 1957) and noted in our series (20 of 43). Pregnancy complications accounted for one-quarter of the total (25), and 17 of these patients were dialysed. Twenty-three patients recovered. Post-traumatic and post-operative causes accounted for a further quarter (25), and of these 18 patients were dialysed. The mortality was much greater, only seven out of 25 patients recovering. These workers noted the more rapid progression of the disease and the need for earlier dialysis in this group. Shackman (1959), in an excellent review, reported 106 patients admitted to hospital with renal failure, 43 of whom were submitted to dialysis. Excluding those patients with persistent and lethal extrarenal primary lesions, and those with irrecoverable renal lesions, the recovery rate after dialysis was 11 of 26 patients.

SUMMARY.

The principles of hæmodialysis in the treatment of renal failure have been discussed.

A Kolff disposable coil dialysing unit is described, and a short history and outline of the technique, indications and contraindications of dialysis is given.

A series of 71 patients referred to the unit is discussed. Hæmodialysis was performed on 40 occasions on 34

patients. Of 20 patients with acute renal failure treated by dialysis, nine survive.

The clinical and biochemical improvement after dialysis in acute renal failure is usually striking. No serious complications of dialysis have occurred. The value of dialysis as an adjunct to the conservative management of acute renal failure is stressed, and the indications for dialysis are discussed. Patients who are considered likely candidates for dialysis should be referred at an early stage to the nearest dialysing unit, before irrecoverable changes occur.

Chronic renal disease is unlikely to be ameliorated by dialysis, but when the diagnosis is uncertain, dialysis should be performed to enable a diagnosis to be made.

ACKNOWLEDGEMENTS.

The management of the patients admitted to the unit was the joint responsibility of the University Departments of Medicine and Surgery, and the decision to proceed with dialysis in each case was made by Professor R. R. H. Lovell or Dr. A. E. Doyle, of the Department of Medicine; I am grateful to them for permission to publish these cases and for much helpful advice. Professor M. R. Ewing has given valuable criticism and advice in the preparation of this paper. The cooperation of the numerous physicians and surgeons who have referred cases has been appreciated.

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THE PREVENTION OF SUICIDE.

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SCARCELY a day passes without a number of road accident deaths being reported in the news. Over the years this morbid death interest has shown no change in subject, but only in material. Thus the *Australian Sketcher* of 1873-1876 gave as lurid and as regular an account of the suicides then as do the daily newspapers of the road accidents today.

The numbers of suicides at the present time are probably about the same as the road fatalities, but for better or for worse the Press interest in road accidents has replaced that in the other forms of self-destruction.

I.

The official records of suicide need liberal interpretation, and it is usually supposed that the numbers recorded are no more than half of those that actually occur. Suicide is an unpopular verdict for any coroner to record, as it is a stigma on the family. Therefore, the relatives are rightly given the benefit of any existing doubt. Moreover, the recorded suicides are likely to vary according to a number of factors, which are to be found in the community attitude to suicide. For instance, if suicides are censured in a country with a single religious denomination, then the numbers are likely to be low. In others, there may be some political reason for either wishing to highlight the numbers of suicides (as when a country feels itself oppressed), or alternatively, to minimize them, when a country wishes to appear more settled than is the case. Again, suicide depends on the culture, and in countries where it is an honourable death the figures will be higher; in those with a rigid hierarchy, the figures may also be on the high side. From time to time there may be a rearrangement in the method of recording; and as an example, now that the Commonwealth has taken over the statistics, instead of the States, this may make a difference to the over-all Australian figures.

The figures I have available came through the courtesy of the Government Statist. The "Demographic Year Books" of the United Nations record the deaths caused by suicide and self-inflicted injury. Of the 60 countries mentioned, 11 have suicidal rates of greater than 15 per 100,000 of the population. Two of these countries are too small, in comparison with the others, to have much statistical value. On the whole, the countries occupy a remarkably constant position in the tables; but it is perhaps of interest that the figures from Hungary were

recorded for the first time in 1957, and that the suicidal rate was 21·7 per 100,000. The tables show that Denmark, Switzerland, Sweden, Finland, France, Japan, Austria, West Berlin and West Germany all have high suicidal rates.

We may subdivide these countries into two groups. The first of them—Switzerland, Sweden, Finland, Denmark and France—are countries which all have a high rate of alcoholism. In the other group—Japan, Austria, West Germany and West Berlin—there are other factors. Japan has always had a high rate for cultural reasons, whilst Austria and Germany are comparatively rigid countries.

In 1953 Australia is recorded as having 959 suicides, with a rate of 10·9 per 100,000, putting it in the top third; but in 1957 there were 1170 suicides, with a rate of 12·1 per 100,000, putting it in the top quarter of the 60 countries recorded in these tables. But in the case of Victoria, the suicidal rate recorded for 1956-1958 was only 8 per 100,000 as against the Australian figures of 12·1. For males the Victorian rate was 11·5 per 100,000 and for females 5·1 per 100,000. I have no means of examining the comparative returns from the other States, for in doing so one would not only have to examine the coroners' open verdicts, the accidental deaths and deaths from misadventure, but also to look into the reports concerned, both in urban and in rural areas.

In Victoria in 1959 there were 204 suicides recorded from the metropolitan coroner's court, open findings were given in another 165, and misadventure was the verdict in 108 and accidental death in 408. It must be left to conjecture to decide how many of the cases were rightly given the benefit of the doubt in a community where a suicidal verdict reflects on everyone concerned. If the corresponding figures were examined for the country areas, it is likely that the proportion of recorded suicides would be lower, not only for the reason that the numbers are usually less in the rural areas, but also because a suicide has more effect in these communities than in the urban districts.

Many other interesting facts are known about suicide, though they differ somewhat from one part of the world to another. On the whole, it would appear that suicides are about three times as frequent in males as in females, whereas suicidal attempts are about three times as frequent in females as in males. The ratio of suicidal attempts to completed suicides is variously reported as between 5 and 10 to 1.

Part of the discrepancy between the male and female numbers may be because in general men tend to use the more violent means of suicide—for example, by gunshot or hanging, whereas the women more frequently attempt to gas themselves or else use hypnotics. It is interesting that after the introduction of free drugs through the English National Health Service, suicides attempted by the use of barbiturates increased considerably at the expense of the other methods. Stengel in this context wrote that "The National Health Service has by unwittingly offering sleep for death reduced the suicidal rate". Presumably many of the patients who took barbiturates and recovered might otherwise have resorted to more violent and sure means.

Fischer recently analysed the number of people who had attempted suicide and been admitted into the receiving hospital in Sydney. Of 2168 male patients, he found that 10·5% had made suicidal attempts before their admission, whereas of 1520 females admitted 11·3% had made attempts at suicide before coming into hospital; thus in this case there is not very much difference in the sexes. These figures are also of interest, because people admitted to other early treatment psychiatric units for attempted suicide have been found to number anything between 12% and 20% of admissions.

In the 1953 figures collected by Dr. John Cade for me, 420 of the 2000 patients admitted to Royal Park Psychiatric Hospital had made suicidal attempts. In that year these 2000 cases represented about three-quarters of the total admissions to all such hospitals in Victoria.

In 1953, two general hospitals, representing about one-fifth of the total general hospital beds in Victoria, admitted between them 320 patients who had attempted suicide. These figures, taken in conjunction with the mental hospital figures, would suggest there were at least 2000 attempted suicides seen in all the hospitals, against about 250 recorded deaths from suicide in the same time.

One of the most interesting hypotheses was that advanced in figures quoted by Pullar-Streker, in which he showed that there was some relationship between the total aggression concerned in suicide, homicide and road accidents. It was a pity that the table could not also include the amount of alcohol consumed in the countries he was comparing.

Suicides are highest in spring and early summer; thus in Europe the maximum suicidal rate is in May and June and in Australia in November and December.

The *Australian Sketcher* of 1873 is worth quoting:

> Very many suicides were committed in Melbourne and other parts of the Colony at the beginning of December, their frequency almost amounting to one of those suicidal epidemics which so much puzzle social philosophers.

Another point of interest is that, relatively, there are more suicides in the 60 to 70 years age group than at the younger ages both for males and for females. This may bear a relationship to the difficulty the later age groups have in adjusting themselves to rapid change, and also to the disintegration of family life and the loneliness which follows.

II.

Two particular aspects may be considered in the prevention of suicide. First, how far can we prevent suicide by the early recognition and treatment of the type of illness in which patients are likely to commit suicide? Secondly, how far are we able to alter the environment, especially for the people who are susceptible, to avoid suicides occurring?

1. It is supposed that from 50% to 75% of the people who commit suicide are depressed. The actual type of depression does not particularly matter, and in fact figures have been shown to illustrate that the suicidal attempts come from all sorts of depressive illnesses. Capstick produced interesting figures to show that whilst more of the elderly people were depressed before the act, more of the younger were emotionally disturbed. There is an appreciable hereditary factor in the manic-depressive or affective illnesses, and about 10% of the children of parents with this condition are similarly affected. But an appreciable number of schizophrenics begin their illness with depression-like symptoms, and organic disorders, especially in association with cerebral arteriosclerosis, often present as depressions.

2. There are two particular environmental factors amongst the many others which may be mentioned. The first concerns the family. Walton considered the histories of 60 patients who had committed suicide, with a view to finding out how much parental deprivation, social deprivation and social degradation had been concerned with the act. He showed that parental deprivation had a highly significant relationship to suicide, but that neither social deprivation nor social degradation had any significant effect upon its occurrence. Nevertheless, the themes of social disintegration and isolation have been popular since the writings of Durkheim. Walton found that there was parental deprivation or some serious family trouble in no less than 46 of these 60 suicides.

Secondly, there is little doubt that alcohol contributes appreciably to the suicidal rate and to the attempted suicides. Figures have shown that 20% or more of people who attempt suicide are heavy drinkers or alcoholics, in reports from countries as far separated as Scotland, Sweden and U.S.A. Of the 420 patients admitted to Royal Park who had attempted suicide, 17% were alcoholics. There is a considerable amount of psychopathological evidence that in some cases alcoholism is

to be regarded as a slow form of suicide. Therefore, in considering the environmental factors which may be modified, particular attention should be paid to maintaining an intact home, especially for those people who are susceptible because of either their temperament or their heredity.

Thus, in mental health education, it is worth stressing that the intact family is one of the best forms of insurance against depressive symptoms, and also that alcoholism is not a remedy for suicidal tendencies, but that the two are often associated. Moreover, if alcohol is used to relieve depression, the end results may be worse than the original disorder and far less easily treated.

III.

If suicide occurs most frequently in association with the severe depressive illnesses, and if early recognition is one of the best forms of prevention, then it is essential to know the early symptoms of these illnesses. First, insomnia is an important sign, particularly when people wake in the early hours of the morning. The sufferers often get off to sleep when they first go to bed, and then awake about 2 or 3 o'clock and restlessly turn over their troubles; they blame themselves for a host of minor matters and are unable to sleep again. Secondly, many of these depressives feel worse, and have more self-depreciation, in the early part of the day; but as it goes on they improve, and so become rather better by the evening. Thirdly, they have anorexia, a loss of interest in food and a loss of weight. Fourthly, they show a change in mood and feelings, and lose interest in their surroundings and in their sex lives. They have an inertia, a reduction of energy, a loss of drive, and they withdraw from their social activities.

It is important to know that many people with depressive illnesses commit suicide in a phase of apparent improvement. One of the difficulties in the prevention of suicide is that those who are depressed often seek some other person's advice before their doctor's. This person is often a clergyman, because the depressives' self-depreciation is such that they feel inadequate and guilty, and so quite logically go to their spiritual advisers for help. The police also come into contact with depressed people, who feel that they must confess their guilt, or who are showing behaviour suggestive of attempting suicide. So it is very necessary that these two groups of people, as well as those working in social agencies, should fully understand the symptoms of depression and the very real possibility of resulting suicide.

There seems often to be reluctance to tell people about the symptoms of depression. It is sometimes said that people will become frightened by knowing these facts; but if the public needs to know the early symptoms of cancer, why not the same in the illnesses often resulting in suicide?

IV.

It would thus seem that the most important means of preventing suicide is the education of physicians, clergy, police and the lay public.

In an average family practice there will be a suicide every two years and up to five suicidal attempts every year. But, with the exception of the loss of a mother in childbirth, perhaps there is no worse tragedy in general practice than a suicide. Yet medical students or housemen have very little opportunity of seeing cases of depression, compared to the frequency of their occurrence in practice. Therefore, it is very necessary that medical teaching should urgently repair this omission.

In two series of suicides it was found that only 40% in one and 53% in the other were under medical care at the time of their suicide. In another series (Capstick, 1960) this figure was 78%, but only 18% of these had been referred to a psychiatrist. Suicide might have been prevented in many of these cases if the doctors concerned had been taught more about the early symptoms of the depressions and the means available for their relief.

Next, to prevent suicide we must understand more about the kinds of people who are susceptible and the types of illnesses concerned. As yet we do not know enough about the motives involved; but it would seem well worth paying much attention to the loneliness of the aged. Those living alone should be especially encouraged to find the companionship offered by social organizations within the community.

The public attitude could be changed if suicide was understood to be an outcome of illness rather than a sin or crime. The Press, the radio and television could give much help in this way.

Perhaps it is not recognized sufficiently often that suicidal thoughts will spread. Frequently it happens that if a person has committed suicide, particularly if there is much publicity or public disturbance associated with the act, another person will follow, and there are occasions when a crop of suicides have been reported in a short space of time. Certain places become notable for suicide, like the San Francisco Bridge or the Sydney Gap; "jumping over the gap" or "jumping in the lake" become commonplace figures of speech, and are a relief mechanism of laughing at our fears. But to those who are ill, and highly suggestible, such thoughts may be so meaningful that they become obsessional, compulsive and even lethal to them.

Another way to prevent suicide would be to ensure that the person coming to the casualty department of a hospital after attempting suicide should not leave without having psychiatric advice. Time after time people come to casualty wards, have their stomachs washed out or their wounds stitched up, and are discharged, perhaps never to be seen again.

Many of those who attempt suicide are in the class of self-injury rather than self-destruction, according to Stengel's distinction. Nevertheless, there are sufficient examples recorded to show that many people have made a number of suicidal attempts before finally being successful, and therefore no attempt can be lightly regarded. In every case of attempted suicide, the patient's confidence must be gained, the full cause elucidated and treatment instituted as it is required.

V.

In Victoria some initial steps have been made towards combating suicides. These are not as yet very adequate, but even the present efforts should be of some assistance.

First of all, a "Personal Emergency Advice Service" has been started. This has an easy telephone number, 41-5678; or alternatively, there is a post office box number to which patients can write. Such services are not new, and indeed individuals and organizations have begun them in many parts of the world. They are most highly developed in Holland and are especially associated with the name of Professor Querido in Amsterdam. The Amsterdam advice service enables people to telephone, to write or to attend in person, or for their doctors to call out psychiatrists or social workers when their patients are in trouble.

Perhaps the only remarkable thing about the Victorian service is that it is staffed by 130 volunteers, from all walks of life, who attend a central telephone department on a roster basis. They have been trained by social workers and psychiatrists by means of group discussions, which were held twice weekly for a period of six months. There have been an average of 50 telephone calls each week since the service opened. They have ranged from emergency calls by those who were severely emotionally distressed, to inquiries from others with family or housing problems; some had alcoholic, geriatric or mentally ill relatives; others had been discharged from mental hospitals. Questions were asked about retarded children, marital troubles or other domestic crises, or even the whereabouts of the venereal diseases clinic. In the large majority of these cases a satisfactory solution could be found, and the person in distress was helped by being usefully advised as to what best to do. To be able to

speak to someone at length has often been of considerable assistance to the people concerned, and has enabled them to solve their own problems; alternatively, they have seemed to be sufficiently relieved by their conversation to wait until they could return for advice to their own doctors, to an out-patient clinic or to a social agency.

Secondly, for the last five years the Mental Hygiene Authority has run a course for theological students, to equip them to understand the sort of psychiatric difficulties they will meet amongst their parishoners. They are particularly taught about the symptoms of depression, the accompanying guilt feelings and the danger of resulting suicide.

The police have instruction in psychiatric illnesses, and an increasing amount of information is also being given to the lay public towards encouraging early treatment, and indirectly, preventing suicide.

The breaking down of prejudices and fears will encourage people to seek earlier treatment. Those who previously needed to go to hospital will then be seen as out-patients or in the day hospitals. People are less frightened of being treated whilst living at home than of facing the insecurity of the hospital. The chances of recovery from a depression are excellent, and most depressions can be treated in the community; but delay inevitably results in some cases of suicide.

In the future I hope that Victoria may have a similar sort of casualty ward for attempted suicide as that existing in Copenhagen or in Stockholm. To have such a ward for attempted suicides results in ease and speed of treatment, and there is increased efficiency in their immediate management by the general physicians and surgeons. Moreover, then the patients can always be put into the care of the psychiatrist, to make a decision as to what should best be done for their future treatment.

There are many psychiatric problems connected with suicide which are still to be solved, and in particular much is to be learnt about avoiding the schizophrenic illnesses. But in the prevention of suicide by the treatment of depression we are on surer ground. Since most of the suicides are associated with depressive illnesses, it would appear that our main efforts should be directed towards the early recognition of these conditions, for their prognosis with adequate treatment is excellent.

Summary.

There are reasons why the recorded deaths from suicide are probably considerably less than the true numbers.

In Australia it is likely that the numbers of deaths from suicide and from road accidents are very similar.

The types of illnesses and some of the environmental factors concerned in suicide are discussed.

The symptoms of depression are described as a plea for its more widespread recognition and early treatment.

There is a need for improved medical education in this subject, and particularly for the better care of attempted suicides attending hospital casualty departments.

Some of the means of preventing suicide in Victoria are discussed, amongst which are a "Personal Emergency Advice Service", training schemes for clergy and police and encouragement for the public to seek early treatment.

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THE CLINICAL FEATURES OF MULTIPLE SCLEROSIS.[1]

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DESPITE published series on the clinical features of multiple sclerosis (including Brain, 1930, Müller, 1949, and McAlpine *et alii*, 1955) it has been our experience that medical practitioners in Queensland are hesitant in diagnosing the disease. This may be so for the following reasons: (i) "There are few diseases which raise such difficulties of diagnosis as disseminated sclerosis" (Brain, 1930); (ii) the disease is relatively less common in Queensland than in the British Isles and certain parts of North America (Allison and Millar, 1954; McAlpine *et alii*, 1955; Sutherland *et alii*, to be published); (iii) the lack of familiarity engenders problems in recognizing the disease. However, our investigations suggest that in Australia, multiple sclerosis does occur with sufficient frequency to merit consideration in the differential diagnosis of many neurological conditions.

The series on which our views are based comprises 42 cases of multiple sclerosis (M.S.) seen in Queensland, 127 cases in the north of Scotland and 389 in Glasgow—a series totalling 558 cases.

Analysis of Clinical Material.

Age and Sex Incidence.

The age and sex incidence are shown in Figure I and Table I respectively. The onset of the disease is generally between 20 and 40 years of age. In only four instances did the first symptom occur earlier than 15 years (0·71%). These four case histories are summarized in Table II. Although a diagnosis of M.S. is rarely entertained in children, such instances, and the experience of others, indicate that the disease may affect patients before the age of 15 years. For example, Gall *et alii* (1958) estimated that 0·4% of patients developed the disease under 15 years of age in a series of some 3000 M.S. patients. As McAlpine *et alii* (1955) emphasize, the disease is exceedingly rare in the first decade of life, and in general a diagnosis of M.S. in this age group should remain suspect.

We have encountered brain-stem encephalomyelitis in early childhood, which, by reason of its physical signs and relapsing course, resembled M.S. However, in such instances, and in the present state of our knowledge, a diagnosis of M.S. is scarcely justified. In individual cases, subsequent events may indicate this diagnosis. Thus van Bogaert (1950) suggests that M.S. may become grafted on to a previous attack of acute encephalomyelitis. On the other hand, Ferraro (1958) maintains that M.S. itself may represent the chronic stage of any acute disseminated encephalomyelitis, and that the two conditions have a "common infectious-allergic or toxic-allergic etio-pathogenesis".

The sex incidence in the present series is in accordance with figures published elsewhere (for example, Wilson, 1940; McAlpine and Compston, 1952; Allison and Millar, 1954; Brain, 1955) and indicates a slight preponderance of females patients.

Familial Incidence of Multiple Sclerosis.

Most authorities agree that secondary cases of M.S. occur with much greater frequency in the families of patients with the disease than in the general population.

[1] Based on a paper read by one of us (J.M.S.) at a meeting of the Australian Association of Neurologists, Melbourne, May, 1960.

Thus, Pratt, Compston and McAlpine (1951) reported multiple cases within families in 6·5% of a series of 310 cases, and in Northern Ireland a figure of 6·6% was obtained by Allison and Millar (1954). In the north of Scotland series of 127 cases, a relative was considered to have M.S. in 14 instances or 11% (Sutherland, 1956). If near relatives only are considered, a figure of 7·1% was obtained; in this series 545 siblings and 162 children of the index patients were at risk; of these, seven siblings (1·3%) and two children (1·2%) developed the disease. In a control group of 132 healthy people, belonging to similar sex and age groups, and living in the same geographical area, no cases of multiple sclerosis occurred in the related 614 siblings and 214 children. These figures support the contention of workers such as Curtius (1933), McAlpine (1946) and MacKay (1950) that there is a transmitted constitutional vulnerability to the disease. However, this must be slight, and as was reemphasized by Symonds (1959), the possibility that multiple cases in a family result from exposure to some common environmental factor cannot be excluded. In the present series no instances of consanguinity were admitted, save two cases in the north of Scotland group.

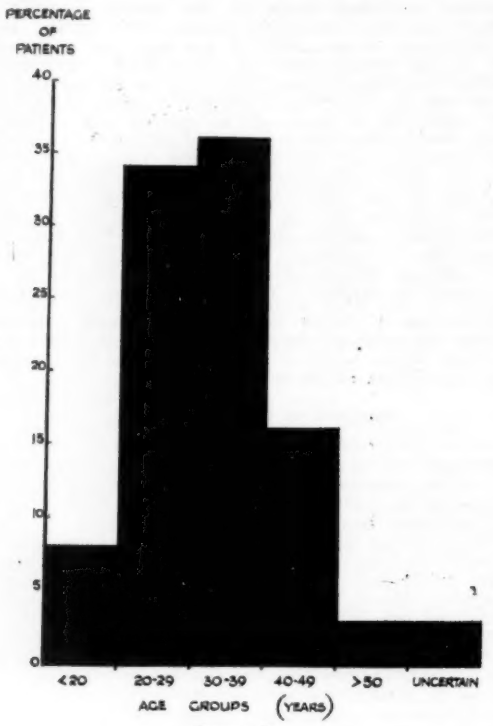

FIGURE I:
Age of onset, 558 cases of multiple sclerosis.

Initial Symptoms.

It is important to regard M.S. in its early stages as a disturbance of function of the nervous system, and at this time signs of organic nervous disease may be absent. Conversely, as Ferguson and Liversedge (1959) emphasize, physical signs in M.S. may outstrip related symptoms.

Table III indicates the initial symptoms in our series. It is apparent that in 90% of cases these included motor weakness, visual disturbance or paræsthesiæ as initial symptoms, and that in some 10% of cases the onset was accompanied by what may be termed atypical symptoms. It is possible that the latter, and the frequent transience of the initial symptoms, are responsible for the usual failure of diagnosis until the fourth or fifth year of the disease (McAlpine, 1957), and for Buzzard's statement in 1897 that "the full-grown disease is frequently not recognized, the infant disease practically never".

Symptomatology of the Established Disease.

The symptoms at the time of our examination are shown in Table IV. Successive episodes of the disease involving spinal cord, brain-stem, cerebellum, cerebrum and optic pathways, and the predominance of the lesions in one or other area, tend to produce a number of clinical types of M.S. Table V indicates how M.S. can enter into the differential diagnosis of a variety of important neurological conditions.

Psychiatric Manifestations.—Denny-Brown (1952) has emphasized the remarkable personality changes which may occur in the course of the disease, especially euphoria. Of the 42 patients comprising the Queensland series,

TABLE I.
Sex Incidence.

Series.	Male.		Female.	
	Number.	Percentage.	Number.	Percentage.
Queensland	19	45·2	23	54·8
North of Scotland ..	56	44·1	71	55·9
Glasgow	173	44·5	216	55·5
Total cases ..	248	44·4	310	55·6

26 were regarded as mentally normal, 16 mentally abnormal. Of the latter, seven exhibited euphoria, six "hysterical" features, four emotional lability, three depression and two intellectual impairment. Our experience suggests that the psychiatric manifestations of M.S. fall into two groups. (i) In the earliest stages hysterical symptoms are common. Thus Canter (1951) found that 21 of 33 service patients with M.S. had earlier been diagnosed as suffering from hysteria, and Langworthy and Le Grand (1952) refer to the fact that M.S. patients are often diagnosed as suffering from conversion hysteria, not only because of the nature of their complaint, but also because of their emotionally immature personality structure. (ii) As the disease progresses, failure of judgement and dementia (of which euphoria and emotional lability may be manifestations) become evident. Denny-Brown (1952) also stresses the occurrence of lack of responsibility, poor judgement and poverty of memory, which very gradually become evident in progressive forms of the disease.

Cranial Nerve Involvement.—Particular interest attaches to the optic nerve, the oculomotor nerves and the trigeminal nerve. Adams, Sutherland and Fletcher (1950) suggested the diagnostic significance of mydriasis, ocular imbalance and hippus. Of 100 consecutive cases from the present series, these signs were encountered in 90%, 52% and 38% respectively. A pathological degree of pallor of one or both optic discs was found in 17% of patients. This figure is considerably lower than that of 27% reported by McAlpine *et alii* (1955) and 20% by Müller (1949), However, we restricted the diagnosis to those cases in which there was confirmatory evidence, such as a history of optic or retrobular neuritis, evidence of a central or paracentral scotoma or significant reduction of visual acuity, which could not be accounted for by other ocular disease. It is probable that, as was emphasized by Adams (1927), the most common cause of unilateral retrobulbar neuritis is M.S. Nystagmus occurred in 63% of patients and was usually of the horizontal type. In a few instances nystagmus occurred in the abducted eye only (ataxic

TABLE II.

Sex and Age of Onset. (Years.)	First Symptom(s).	Remissions and Exacerbations.	Subsequent Neurological Features.	Cerebro-Spinal Fluid Findings.[1]
Female: 10 ..	Diplopia, weakness of left leg.	Present.	Aged 40; signs of bilateral pyramidal and cerebellar insufficiency, ocular imbalance with diplopia.	Normal.
Male: 11	Retrobulbar neuritis.	Present.	Aged 31; signs of bilateral pyramidal, cerebellar and posterior column lesions.	Frankly paretic colloidal gold curve.
Female: 14 ..	Paraesthesiae of both hands.	Present.	Aged 17; gross signs of bilateral pyramidal tract and cerebellar insufficiency.	Colloidal gold curve: 1331000000. 5 mononuclear cells per cubic millimetre.
Female: 14 ..	Hemiparaesthesiae.	Present.	Aged 16; bilateral pyramidal tract lesions, unilateral third nerve paralysis.	Colloidal gold curve: 3343100000.

[1]Blood and cerebro-spinal fluid Wassermann reactions negative.

TABLE III.

Initial Symptoms Occurring Alone or in Combination.

Symptom.	Series.						Totals	
	Queensland.		North of Scotland.		Glasgow.			
	No.	%	No.	%	No.	%	No.	%
Weakness of one or more limbs ..	23	54·8	79	62·2	200	51·4	302	54·1
Dimness or loss of vision	8	19·1	13	10·2	54	13·9	75	13·4
Diplopia	4	9·5	13	10·2	50	12·8	67	12·1
Paraesthesiae	6	14·3	19	15·0	34	8·7	59	10·6
Ataxia or vertigo	5	11·9	4	3·2	17	4·4	26	4·7
Disturbed micturition	—	—	3	2·36	11	2·8	14	2·5
Discomfort in back	1	2·4	4	3·1	3	0·8	8	1·4
Pain in legs	—	—	3	2·4	3	0·8	6	1·1
Epilepsy	—	—	3	2·4	2	0·5	5	0·9
Tremor of hands	1	2·4	4	3·1	—	—	5	0·9
General debility	—	—	—	—	4	1·0	4	0·7
Numbness of face	1	2·4	1	0·8	2	0·5	4	0·7
Dysarthria	—	—	1	0·8	2	0·5	3	0·5
Unilateral paresis of face	1	2·4	—	—	2	0·5	3	0·5
Mental confusion	—	—	—	—	3	0·8	3	0·5
Vomiting		—	—	—	1	0·3	1	0·2
Tic douloureux	—	—	1	0·8	—	—	1	0·2
Nervousness anxiety	—	—	—	—	1	0·3	1	0·2
Weakness of back	—	—	1	0·8	—	—	1	0·2

TABLE IV.

Symptoms at Time of Our Examination.

Symptom.	Series.						Totals.	
	Queensland.		North of Scotland.		Glasgow.			
	No.	%	No.	%	No.	%	No.	%
Paralysis of one or more limbs ..	38	90·5	117	92·1	368	94·6	523	93·7
Disturbed micturition	7	16·7	31	24·3	173	44·5	211	37·8
Paraesthesiae	13	30·9	38	30·0	135	34·7	176	31·5
Diplopia	11	26·2	15	11·8	84	21·6	110	19·7
Dimness or loss of vision	14	33·3	12	9·4	57	14·6	83	15·0
Ataxia or vertigo	20	47·6	3	2·4	32	8·2	55	9·9
Numbness of face	2	4·8	6	4·7	14	3·6	22	3·9
Pain in legs	—	—	3	2·4	11	2·8	14	2·5
Dysarthria	1	2·4	7	5·5	6	1·5	14	2·5
Unilateral facial paresis	1	2·4	—	—	12	3·1	13	2·3
General debility	—	—	3	2·4	10	2·6	13	2·3
Pain in back	—	—	—	—	10	2·6	10	1·8
Headache	—	—	—	—	8	2·0	8	1·4
Tic douloureux	2	4·8	2	1·6	3	0·8	7	1·3
Vomiting	—	—	1	0·8	3	9·8	4	0·7
Deafness	—	—	—	—	3	0·8	3	0·5
Epilepsy	—	—	1	0·8	2	0·5	3	0·5
Dysphagia	—	—	—	—	2	0·5	2	0·4

nystagmus — Harris, 1944), and in two patients rotatory nystagmus was present. Harris (1950) drew attention to the occurrence of *tic douloureux* in M.S., and Mallin (1958), reviewing the literature, found that 131 cases of *tic douloureux* associated with M.S. had been reported. In 22 of these instances *tic douloureux* was the initial symptom. Penman (1960) stated that in approximately 4% of cases of *tic douloureux* there was evidence of M.S. or "chronic spastic paraplegia". In the present series of 558 cases, *tic douloureux* occurred as the first symptom in one instance (0·2%) and as a feature of the established disease in seven cases (1·3%).

The Reflexes.—"The almost constant absence" of the superficial abdominal reflexes was emphasized by Adams (1921). Our experience leads us to attach significance to the following abnormalities of these reflexes in a young patient: (i) loss; (ii) inequality; (iii) readily exhausted responses; (iv) hypoactivity in comparison with tendon reflexes; (v) diminished superficial abdominal responses in conjunction with exaggerated or unequal abdominal muscle reflexes (Wartenberg, 1953). These signs are all suggestive of dysfunction of corticospinal pathways. Confirmation of an upper motor neuron lesion may be obtained by unilateral exaggeration of

TABLE V.
Differential Diagnosis of Multiple Sclerosis.

Clinical Form of M.S.	Presenting Features in the Series.	Differential Diagnosis.
I. Cerebral form.	Headache. Vomiting. Epilepsy. Mental changes. Hemiplegia.	Intracranial space-occupying lesions—for example, tumour, hæmatoma, aneurysm, abscess. Diffuse sclerosis (Schilder's disease). Subacute progressive encephalitis (Merritt, 1959; Dawson, 1933; van Bogaert, 1945).
II. Ocular form.	Diplopia. Dimness or loss of vision. Field defects. Nystagmus. Optic neuritis. Optic atrophy.	Various causes of optic neuritis, retrobulbar neuritis and optic atrophy. Intracranial space-occupying lesions, as above. Neuromyelitis optica (Devic's disease). Myasthenia gravis. Adhesive arachnoiditis.
III. Brain stem — cerebellar form.	Diplopia. Disturbance of equilibrium. Dysarthria. Facial paresis. *Tic douloureux*. Dysæsthesia of face. Facial paresis. Deafness. Vomiting. Dysphagia.	Intracranial space-occupying lesions. Cranial nerve lesions such as *tic douloureux* (Harris, 1950). Vestibular neuronitis (Dix and Hallpike, 1952). Angiomatosis of brain stem. Basilar impression. Myasthenia gravis. Olivo-ponto-cerebellar atrophy.
IV. Spinal form.	Paresis of leg or legs. Disordered micturition. Paræsthesiæ. Pain in leg or back. Disturbance of equilibrium.	Cord compression, as from neoplasm. Cervical spondylosis (Brain and Wilkinson, 1957). Dorsal disc degeneration (Logue, 1952). Primary spino-cerebellar atrophies. Motor neuron disease. Subacute combined degeneration of cord. Syringomyelia. Adhesive spinal arachnoiditis. Arteriovenous malformation.
V. Combinations of the above.	Symptoms referable to several levels of the neuraxis.	Viral or (?) viral encephalomyelitis. Encephalo-myelo-radiculitis (Miller *et alii*, 1957). Neurosyphilis. Atherosclerosis. Carcinomatous neuropathy. Hysteria.

a knee jerk, by increased tone in a limb or by an extensor plantar response. In this respect we have found that Chaddock's test may indicate pyramidal damage when the plantar response (Babinski) is flexor or equivocal.

The Cerebro-Spinal Fluid.

Table VI indicates relevant findings in the cerebro-spinal fluid from 125 cases of multiple sclerosis in this series. (These 125 cases comprised 42 successive cases of the Queensland series plus 83 successive cases of the Glasgow series.)

TABLE VI.
Cerebro-Spinal Fluid Findings in 125 Cases of Multiple Sclerosis.

Table VIA.

Observation.	Range.	Mean.
Cells per cubic millimetre (mononuclear)	0–20	5
Protein content (mg. per 100 ml.)	30–85	48

Table VIB.

Result of Lange's Colloidal Gold Test.	Number of Cases.
Negative	41 (32·8%)
First-zone (paretic) curve	57 (45·6%)
Mid-zone (luetic) curve	17 (13·6%)
Slight abnormality (precipitation to degree "2" in more than one tube)	10 (8·0%)

Cell counts were generally at the upper limit of normal and only rarely was the protein content much elevated. In a much larger series, Locoge and Cumings (1958) found that in 1·9% of 690 cases the protein content was in excess of 150 mg. per 100 ml. Although these authors state that autopsy proof of the diagnosis was available in many instances, we hold that if a protein content of over 100 mg. per 100 ml. is encountered, one should seek an alternative diagnosis (McAlpine *et alii*, 1955) or an explanation (for example, recent myelography).

Introduced as a test for neurosyphilis, it was later shown (for example, Adams, 1921) that Lange's colloidal gold test was non-specific and that a positive result occurred commonly in the cerebro-spinal fluid of M.S. patients. In 1938, Aring alluded to changes in the gold curve occurring in familial ataxia, olivo-ponto-cerebellar atrophy, subacute spino-cerebellar atrophy and primary parenchymatous degeneration of the cerebellum — conditions which might well enter into the differential diagnosis of M.S. We have encountered first zone (paretic) curves in multiple myeloma, in three cases of chronic progressive encephalitis and in one case presenting clinical features of the Jakob-Creutzfeld syndrome; in the last four cases cerebral biopsy findings were compatible with the clinical diagnosis. In the present group of cases, a significantly positive result to the colloidal gold test occurred in almost 60% of instances. Depending on the technique adopted, the sensitivity of the gold sol and the interpretation, positive results have been reported in from 30% (Locoge and Cumings, 1958) to 93% (von Storch *et alii*, 1949) of cases of M.S.

Conclusions.

Although M.S. commonly runs a chronic course, the onset may be sufficiently sudden to suggest a vascular lesion. This rapidity of onset has been referred to by Adie (1932). In the present series the first symptom was fully developed within a few minutes in 17% of cases and within a few hours in a further 22%.

The common initial symptoms are motor weakness, visual disturbance and paræsthesiæ. However, the possibility of M.S. should be considered in patients presenting with "hysterical" symptoms, vertigo, facial paralysis, trigeminal neuralgia and disturbed micturition. In such instances, findings such as ocular imbalance, nystagmus, abnormal superficial and deep abdominal reflexes and other evidence of pyramidal dysfunction may serve to strengthen the diagnosis.

When a history of multiple cases in a family is obtained, other neurological conditions with a familial incidence must be considered. Diagnostic criteria which

suggest M.S. rather than certain other familial neurological conditions are: (i) a familial incidence limited to siblings (McAlpine, 1957); (ii) the first symptom occurring between 20 and 40 years of age; (iii) a course characterized by remissions and exacerbations; (iv) clinical evidence of scattered lesions in the nervous system; (v) an absence of skeletal abnormalities such as pes cavus or scoliosis; (vi) abnormal cerebro-spinal fluid findings; (vii) a normal electrocardiogram.

A feature of the central nervous system is that the same causal agent can give rise to many and varied clinical pictures; conversely many different causes may be responsible for the same clinical picture. For these reasons ancillary investigations, such as examination of the cerebro-spinal fluid (including manometry), myelography, pneumoencephalography, angiography and gastric analysis may be indicated by the clinical features of the patient.

Summary.

Multiple sclerosis occurs with sufficient frequency in Queensland to enter into the differential diagnosis of many neurological conditions.

An analysis of some clinical features in a series of 558 patients with M.S. is presented, reference being made to the initial symptoms, the symptomatology of the established disease, the rare familial incidence and the changes in the cerebro-spinal fluid.

Acknowledgements.

We are grateful to Sir Russell Brain and Dr. H. A. Clegg for permission to utilize clinical material previously referred to in *Brain* (Volume 79, 1956, page 635) and the *British Medical Journal* (Volume 2, 1950, page 431) respectively. The senior author of the latter paper was Dr. D. D. K. Adams, to whom we are indebted for encouragement and permission to draw on this paper.

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Reviews.

Intra-Osseous Venography. By Robert A. Schobinger, M.D.; 1960. New York and London: Grune & Stratton. 7" x 10", pp. 256, with many illustrations. Price: $14.50.

THIS monograph, written by a surgeon, is an excellent example of "applied radiology". The basic principle is well known—that radio-opaque dye injected into bone rapidly drains into the related deep veins. Dr. Schobinger has exploited this principle very thoroughly to produce a detailed manual of venography, which is presented in a logical manner, and with an indeed impressive mastery of detail.

The practical approach of the opening chapter remains the overall impression at the end. Throughout, instructions given are precise and detailed, without any superfluous padding. Fifteen sites for injection are listed and then treated in areas of venous drainage. Each chapter discusses the anatomy, the positioning of the patient, the technique of injection and the clinical applications. The illustrations include the patient when necessary, usually an infra-red photograph, and radiographs of the normal and abnormal, each radiograph being accompanied by a clear line drawing to eliminate any difficulty in interpretation. The venograms are supplemented by "classical" methods such as arteriography, myelography or portal phlebography when these are appropriate.

It is difficult to be fair in choosing examples from the diversity offered. The vascular patterns in the lower

extremity, to be found in the last chapter, are of particular interest to us, but this was a case of last but not least. Previously, injection of dye into a rib was found to be an elegant alternative to the usual route for angiocardiography. Injection into the lumbar part of the spine will outline the inferior vena cava, or if the inferior vena cava is compressed, the internal and external vertebral plexuses will be seen. This is not only a fascinating sidelight on Batson's theories, but provides a safe alternative to myelography for demonstrating a herniated intervertebral disc. There is a long section on azygos venography—a technique, if not pioneered by the author, certainly known in the current literature as a result of his work—and there are many other examples.

The radiographs are reproduced to a uniform size of four inches by three and a half inches, and the quality is as good as is possible with angiograms reduced in this way. The clinical interest in veins and the need to visualize them is variable, but once this facile method becomes well known, as this book should ensure, it must surely be more often used. Above all, the book should be of considerable value to radiologists and hospital radiology departments. Our other query is semantic: which is correct, venogram or phlebogram?

Heritable Disorders of Connective Tissue. By Victor A. McKusick, M.D.; Second Edition; 1960. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Limited. 10" × 6¾", pp. 334, with many illustrations. Price: £6 12s.

THIS is a very considerably expanded version of Dr. McKusick's first edition, reflecting the greatly increased volume of knowledge and interest in genetic disorders of connective tissue and, indeed, in medical genetics in general.

The main sections of this book deal with the subjects of the Marfan, Ehlers-Danlos and Hurler syndromes, osteogenesis imperfecta and pseudoxanthoma elasticum. A most comprehensive clinical, pathological and genetical account is given of these disorders, supported by carefully chosen, informative illustrations.

It might be thought that a book devoted to discussion of a few very rare disorders would have limited appeal, but this is certainly not the case. Connective tissue is the cement of the whole body structure, and these few disorders of connective tissue produce manifestations in every system of the body. The monograph thus becomes virtually a text on general medicine written from the point of view of the medical geneticist and contains a wealth of fascinating information. This book, written by an acknowledged authority in the field, should certainly be read by all who are interested in the problems of human genetics. Indeed, it would well repay study by all physicians.

Practical Birth-Control Methods. By Abraham Stone, M.D., and Norman E. Himes, Ph.D.; second edition; 1960. London: George Allen & Unwin Ltd. 8½" × 5½", pp. 208, with illustrations. Price: 21st net. (English).

THIS is a new edition of a book originally published for American readers in 1938. The present edition has been adapted for the British reader in regard to spelling and family-planning services available in Great Britain, including national organizations and county clinics. The presentation is divided into three parts, with 25 illustrations in all. Social and legal aspects comprise the first part and medical aspects the second part, and related problems are discussed in the final section.

The book is directed primarily to help individual members of the public, and to assist them to find a doctor competent and willing to discuss any problems relevant to the subject. However, medical men will find much to interest them in the first chapter dealing with the history of birth control from primitive peoples to the present day. Readers of this journal will be more likely to study the second part of the book, dealing with the medical aspects and apparatus available.

To illustrate the manner in which the book is written primarily for lay readers, we quote the journalistic statement that "enough human eggs to produce the next generation of two billion people could be placed in a space no larger than a bowler hat, and all the genes contained in these eggs would, if they could be gathered together, fill the space of a single aspirin tablet".

Vaginal diaphragms, cervical caps, chemical jellies, creams, suppositories and foams, douches, sponges, tampons and the safe period are all serially described and evaluated in terms of success or failure per hundred married couples. The authors describe at length the so-called safe period, and quote Ogino and Knaus to the effect that ovulation occurs two weeks before the onset of the next menstruation. They insure themselves against any failure by stating that "many additional studies have more or less confirmed this hypothesis". They mention the basal temperature graph as a more accurate method, but fail to emphasize that the luteal phase is not fourteen days long in about 10% of women, in whom it is either several days longer or several days shorter. A study of several thousand basal temperature graphs will underline this fact.

The cervical glucose test is described, but rightly criticized as too uncertain to be of any value for the precise pinpointing of ovulation. The chapter on ineffective and harmful methods is good, and comments are made in this section on coitus interruptus, the intrauterine Grafenberg ring, stems, studs and cervical wish-bone pessaries. The "oral progestogen" method of contraception is included in the chapter devoted to experimental methods.

The third section of the book opens with a discussion on various aspects of abortion, such as "abortion and its control", "abortion and the law", "illegal abortions", and the Japanese experiment on legalization of abortion. There are other sections on infertility, the Rh factor, artificial insemination and adoption.

Our over-all opinion of this book is that it fulfils its aim to give a comprehensive account of birth-control methods suitable especially for marriage-guidance counsellors, students and interested lay readers. The detail is inadequate for a specialist audience, but doctors will find items of general interest in its pages, especially the historical aspect. The publication is clearly printed and well bound, and is recommended to that group of readers for whom it was written. It will be a popular book in libraries where medical books written in non-medical language are sought after.

Radiology as a Diagnostic Aid in Clinical Surgery. By Howard Middlemiss, M.D., F.F.R., D.M.R.D.; 1960. London: William Heinemann Medical Books Ltd. 9½" × 5¾", pp. 160 with 86 illustrations. Price: 30s. net (English).

"THIS book is intended for Surgeons. Most books on Radiology are written for Radiologists and as such include many diagnostic minutiæ, considerable technical detail and much that is academic." This is the opening of the introduction to this book.

This volume is of great value to the surgeon and general practitioner, in that it is an attempt to give to them a fuller understanding of the value of radiology as a diagnostic aid and at the same time to point out its limitation in certain circumstances. Radiological technique is almost completely disregarded, as one would expect, except in so far as it may be necessary to emphasize some point in the clinical evaluation of the case.

The author has done just as he wishes—he has given to the surgeon a fairly comprehensive survey of those "plain roast and boiled" conditions which are the daily problems of a general hospital or private practice. A chapter has even been included to show the advantages of injection of the vascular system, from aortography to venography, and conveys very useful information. The subject matter is well grouped and the illustrations are very good.

It is a book which could be recommended both to general practitioners and to surgeons.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Dental Health in South Pacific Territories", by P. B. Cadell, B.D.Sc. (Q'ld.), M.D.S. (N.Z.); South Pacific Commission Technical Paper No. 131; 1960. Noumea, New Caledonia: South Pacific Commission. 10" × 8", pp. 20. Price: 2s. 6d.

"Summary Data on Filariasis in the South Pacific", by M. O. T. Iyengar; South Pacific Commission Technical Paper No. 132, August, 1960. Noumea, New Caledonia: South Pacific Commission. 10" × 8", pp. 98. Price: 2s. 6d.

"Clinical Cardiopulmonary Physiology", sponsored by the American College of Chest Physicians; second edition; 1960. New York and London: Grune & Stratton. 11" × 7¼", pp. 1016, with illustrations. Price: $28.50.

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SATURDAY, JANUARY 14, 1961.

ALCOHOLISM.

ALCOHOLISM, according to the definition laid down by the World Health Organization, is "Any form of drinking which in its extent goes beyond the traditional and customary dietary use or the ordinary compliance with social drinking customs of the whole community concerned, irrespective of the ideological factors leading to such behaviour, and irrespective also of the extent to which such ideological factors are dependent upon heredity, constitution, or acquired physio-pathologic and metabolic influences". A "problem" drinker is one whose drinking habits create problems such as impaired social, especially domestic, relationships, financial embarrassment, absenteeism, accidents and offences against the law. The "problem" drinker may become the alcoholic, who drinks compulsively until he is "blind-drunk". On the basis of surveys made elsewhere it has been estimated that there are 300,000 "problem" drinkers and alcoholics in Australia; 10% of these are derelicts, 20% are known to the community as drinking to their detriment, while 80% are in the "hidden" category, but still gainfully employed and living seemingly normal lives. Amongst those in the "hidden" category are women who drink secretly because of the social "double-standard" attitude towards alcoholism in their sex. An accountant has estimated that alcoholism is costing Australia some £200,000,000 a year by reason of road and industrial accidents, loss of production from absenteeism and inefficiency, treatment and care in general and special hospitals and penal institutions, and legal actions including divorce proceedings, not to mention the unassessable toll of anxiety and misery in thousands of homes. It is little wonder then that alcoholism is causing great concern in many countries, and one looks anxiously to the report[1] just issued on the conference arranged last year by the Foundation for Research and Treatment of Alcoholism, to see if it has anything new to offer.

If the conference has achieved anything it is in the emphasis laid on the need to regard alcoholism as a disease. Just as the alcoholic must renounce his evasions and deceptions and rationalizations and be guided to the painful realization that he is a sick, maladjusted person, so also must society look at the problem squarely and abandon attitudes of cynical tolerance, indifference or outright rejection before constructive, remedial measures can be instituted. In his address on "Alcoholism and Mental Health" at the conference, Professor W. H. Trethowan urged the point that alcoholism is an expression of mental ill-health like any psychoneurosis or personality disorder, the causes for which are to be sought in childhood, that "golden period" for mental hygiene, in the form of noxious influences and the failure to develop sound physical and mental habits. The prejudices which still operate against the mentally disordered have now to be fought on behalf of the alcoholic.

Papers on the medical treatment of alcoholism covered familiar ground. Biochemical abnormalities in alcoholics are sequels, not predisposing causes, although the chronic drinker may develop a bodily need for alcohol. The alcoholic who has been relieved of his "hangover", depression, delirium tremens, or gastritis and other sequels of his addiction is often far too anxious to leave hospital. In spite of croaking "nevermore", he resumes his old habits and says to himself, like old Omar:

> Indeed, indeed, repentance oft I swore,
> But was I sober when I swore?

Some form of rehabilitation, which usually includes reference to Alcoholics Anonymous, must be instituted as soon as the alcoholic has been brought round to a reasonable state of physical and mental comfort and before he leaves hospital, for that is the time to get hold of him. Drugs like disulfiram and calcium carbimide have deterrent value for those who are willing to take them. The search for a chemical antidote to alcohol overlooks the probability that a "denatured" beverage without the desired "kick" would have little appeal.

Dr. Cunningham Dax indicated that he would like to see epidemiological surveys into ages, sexes, drinking habits, and medical and social histories of alcoholics, for comparison with conditions reported elsewhere and for local guidance. He supported strongly the establishment of centres for the dissemination of information through literature, lectures, broadcasting and television appearances, the cost to be covered by a tax of a penny or two on every bottle of liquor sold. An American visitor, Dr. Morvin Block, referred to alcoholism as a disease not only of the individual but also of society, with medical, psychiatric, sociological and economic involvements, and stressed the need for education on the subject at all levels of society. He considered that teenagers should be taught how to take their liquor, and there should be reference to alcohol and its effects in university courses in the faculties, not only of medicine, but also of law and of the social sciences. Dr. Joel Fort, also from the U.S.A., reviewed physical and psychological theories about alcoholism and agreed with other speakers that much more needed to be known about the nature and origin of the weak points in the alcoholic's personality referred to as vulnerability, low tolerance of stress and frustration, emotional immaturity and social inadequacy. He anticipated "a never ending battle to combat the ignorant and irrational elements within ourselves and our society".

[1] "Alcoholism: A Compilation of Papers Presented to the National Conference on Alcoholism at the University of New South Wales on 8th-12th August, 1960, convened by The Foundation for Research and Treatment of Alcoholism"; 1960. 9½" × 6¾", pp. 188. Price not stated.

Speaking on legal aspects Professor Norval Morris stressed the futility of fines, bonds and short-term imprisonment for many of those who offend under the influence of alcohol. In his opinion there has been in Australia little really effective action regarding the drunken driver. A leading industrialist supported the more open and understanding handling of the alcoholic employee, pointing out that it is not in the best interest of society or of the individual concerned to turn a blind eye to his addiction, or to "fire" him. In an investigatory prowl round some city bars, the President of the N.S.W. Branch of the B.M.A., Dr. B. A. Cook, had been impressed with the number of men who admitted spending most of their time there after working hours, and he suggested the provision of wiser facilities for rest and recreation. But what alternative would appeal to a toss-pot with a full pocket and an empty head? On the other hand, Mr. B. McInerney, President of the N.S.W. Branch of the Australia Hotels' Association, defended the opportunities for sociability provided by hotels and maintained that in his experience few of the customers "degrade themselves with liquor". He went on to say: "Men and women come to hotels with neuroses — they do not acquire them in hotels."

The various aspects of this tremendous problem of alcoholism were discussed frankly and critically at the conference, without any disguising of the difficulties ahead. There was general agreement that mere punitive and hortative methods had failed. It was considered that to cry with Isaiah from pulpit and platform "Woe unto them that rise up early in the morning that they may follow strong drink, that continue until night until wine inflame them" merely drove the evil underground. With a change of attitude from one of rejection to acceptance, which would call for much propaganda and education, the alcoholic, as speakers from overseas testified, would more willingly come forward for treatment. Sir Richard Boyer said: "We as a community have looked upon the issue of alcoholism as predominantly an ethical one, one of social, personal morals. It is that, is still that, and in my view it will always remain that." On the one hand society must accept responsibility for the excesses of its members, and on the other it is through the ethical and moral influences of religious organizations and of those dedicated members of Alcoholics Anonymous and kindred bodies who, in helping others, help themselves, that many an alcoholic has regained self-control and self-respect. The medical profession, with the rest of the community, is under an obligation to determine when alcoholism is a factor in physical and psychological morbidity and to guide the patient towards those influences which are necessary for his full recovery.

Current Comment.

THE SPERMATOGENIC POTENTIAL OF THE UNDESCENDED TESTIS.

THE problem of the undescended testicle has attracted attention from the earliest phase of reconstructional surgery, a vast literature has grown up on the subject, and this is being added to yearly. Nevertheless, much difference of opinion on various aspects of the problem remains and there has been a serious lack of reliable information on one important question, namely, the spermatogenic potential of the undescended testicle after it has been persuaded into the scrotum. C. W. Charny[1] has now published the results of an extensive investigation of this point carried out by means of testicular biopsy performed on undescended testicles both before and after operation and after the descent induced by hormone therapy. He has also studied the growth and development of the normally descended testis from birth to adolescence, so that standards for the normal could be established. The conclusions presented are based on data from 317 testicular biopsies.

Charny first points out that the usual methods of evaluating the management of cryptorchidism in the past have been inadequate. Normal size and position of the testis after treatment of cryptorchidism are not necessarily indicative of normal spermatogenic function. The results of semen examination are applicable only in cases of bilateral cryptorchidism. With the advent of A.I.D. even the answers to *questionnaires* about subsequent paternity are not conclusive.

Up to the age of nine years, Charny states that the undescended testis suffers little damage from its non-scrotal environment. However, at about 10 years of age, when pituitary gonadotrophin secretion is initiated, a lag in development occurs. From then on, the longer the testis remains undescended, the more pronounced is the retardation. The damage to the seminiferous epithelium is proportionate to the duration of non-descent and not to the degree of non-descent. Secondary degenerative changes include sclerosis and peritubular fibrosis and result in irreversible damage. It is pointed out that failure to descend into the scrotum may be due either to a mechanical abnormality, such as an abnormal pathway, or to primary or secondary hypogonadism. The former accounts for about 80% of cases of cryptorchidism. In the remaining 20%, the testes are initially hypoplastic, which is the cause of their non-descent, and primarily hypoplastic testes, whether undescended or scrotal, lack the capacity for normal spermatogenic development. With such testes the initiation of endogenous secretion of pituitary gonadotrophins results in progressive deterioration of tubular epithelium, irrespective of the location of the testis, and enlargement resulting from the administration of gonadotrophin is caused by œdema and not by tubular growth. However, there is a small group in which non-descent is due to a failure in gonadotrophic stimulation, and in this group, descent may result from small doses of chorionic gonadotrophin before the age of 10 years; such testes may be functionally normal. Those which descend after the age of 10 years, or which require large doses of gonadotrophins to induce descent, usually have a reduced spermatogenic potential. Small doses of gonadotrophin have no deleterious effect on the testis, undescended or scrotal, but large doses may permanently depress cellular maturation. The administration of gonadotrophins after orchidopexy, in order to stimulate a testis retarded by its delayed descent, serves only to accelerate and accentuate the degenerative process.

Charny states that in the hands of most surgeons orchidopexy fails to induce or restore normal tubular function. Biopsy of a large number of testes which were brought into the scrotum by a variety of techniques failed to reveal a single instance of normal spermatogenesis. Earlier techniques, such as that of Torek, with fixation to the thigh, and that of Bevan, which entails retroperitoneal dissection, are considered to be sufficiently damaging to prevent proper development of the organ. However, even with more modern and "acceptable" techniques, the functional results have also been bad. Even where the testis was low in the scrotum and of good size and consistency, abnormal spermato-

[1] *J. Urol. (Baltimore)*, 1960, 83: 697 (May).

genesis was displayed on biopsy. Charny concludes that the prevailing methods of treatment of cryptorchidism are unsatisfactory, and that most operative techniques yield better cosmetic than functional results.

Charny argues from this that, if functional results cannot be improved, boys with asymptomatic unilateral cryptorchidism, without evidence of an associated hernia, "should be spared the hazard and inconvenience of orchidopexy". Many would think that this attitude fails to attach due weight to the psychological advantage of a normal scrotal count and to the generally accepted fact that there is an increased tendency for malignant changes to occur in the ectopic testis.

DR. LOUIS BAUER'S LAST NEWSLETTER.

RECENTLY we announced the retirement of Dr. Louis H. Bauer from the position of Secretary-General of the World Medical Association and the succession to that position of Dr. Heinz Lord. Dr. Bauer retires to take up the post of Consultant to W.M.A., with the good wishes of doctors throughout the world. Recently he issued the last of a long series of newsletters (No. 80 of December 2, 1960). Australians who remember Dr. Bauer from his visits at the time of the Sydney Congress in 1955 and again at the W.M.A. Council meeting in Sydney in 1959, will be interested in this newsletter for its personal references, and others will appreciate the picture that it gives of W.M.A. For this reason we reprint it in full.

> The play is done; the curtain drops,
> Slow falling to the prompter's bell;
> A moment yet the actor stops,
> And looks around to say farewell.

But this play is not done. The curtain drops on the first intermission during which the actors will change roles. When the curtain rises again you will find me in the part I have been "Understudying" during the past two months—I shall be your consultant.

Research I have conducted in preparation for my new role indicates I am now "a person who consults another person"; and that I am "one who gives professional or technical advice."

I note that the International Code of Medical Ethics deems unethical "any self advertisement except such as is expressly authorized by the national code of medical ethics". Bearing this in mind I shall confine my advertising statements to the following quotations from the Declaration of Geneva:

> My colleagues will be my brothers;
> I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my patient (brothers).
> I will respect the secrets which are confided in me.

At this moment of transition as I stand with one foot in the Secretary-General's shoe and the other in that of your Consultant, I seem to combine in one entity the past and the future of The World Medical Association. Only the historian is competent to review the past and only a prophet would be so rash as to predict the future. However, as I look back over the past 13 years I see the growth and development that have resulted from the united efforts of the medical profession of the world. Each member medical association has put at the disposal of The World Medical Association its most outstanding national medical leaders. It has been my privilege to know these leaders and I number them among my friends. It seems to me that had the World Medical Association done nothing more in its formative years than create the opportunity and atmosphere within which personal friendships among the doctors of the world could flourish, it has justified its existence. I believe that those who wrote the Constitution recognized this as the basic objective, for without fulfilling this first aim, none of the other six objectives could be realized.

On the whole the criticisms of the Association have been constructive and should provide guidance for the current and future activities of the Association. Those who have been critical of what they seem to consider a static state in the affairs of the Association are probably the same individuals who would lament the absence of production and sales from an industrial plant still under construction.

As I leave the position of Secretary-General, I am glad to report that the "plant" is built; the "machinery" is installed and working smoothly. "Production" is now dependent upon sufficient materials; the "sales" curve will reflect the effectiveness of the promotion given to the programs.

The future lies ahead. Many worthwhile projects await implementation by The World Medical Association. This is the challenge the future holds.

I know you have been told that, like a chain, our organization is as weak as its weakest link. This is but half the truth. Our organization is also as strong as its strongest link. To measure The World Medical Association by its smallest endeavour is to evaluate the services the medical profession provides the people of the world by the failure of the first biological experiment.

In friendship all thoughts, desires and expectations are born and shared with joy. When friends part there should be no grieving, for that which you admired most in your friend may be clearer in his absence, as the mountain is clearer to the climber from the plain. My best has been given in friendship when the hours were alive with sharing. And you, my friends, have given your best to me. The purpose of all this friendship has been the deepening of mutual understanding.

My final words are those of the coming holiday season—a happy and successful new year to you all

and

In perpetuum, frater, ave atque vale.

Sincerely yours,

(Sgd.) LOUIS H. BAUER,
Secretary-General.

WHY ARE THE MOUNTAINS BLUE?

THE question "Why are the mountains blue?" must be familiar to many inhabitants of Sydney, but it refers to a phenomenon which is apparently much more widespread than they suppose. F. W. Went, Director of the Missouri Botanical Gardens, discusses the subject in a recent paper.[1] He points out that, besides the Blue Mountains of New South Wales, there are ranges in various other parts of the world whose names also bear witness to the fact that they are commonly enveloped in blue haze or smoke. Went states that this phenomenon occurs more commonly in summer, often at times when there are no fires; that it is not seen over absolute deserts or over oceans; and that the most pronounced haze occurs on quiet days with low wind velocities. Among the suggested causes which have been put forward to account for it are smoke, dust, water vapour and fog, but Went has little difficulty in showing that none of these explanations are tenable. He therefore concludes that blue hazes must consist of very minute, submicroscopic particles, and that these are formed by the agglomeration or condensation of molecules of volatile organic compounds present in the air, under the influence of the action of sunlight. He points out that it is nearly a hundred years since John Tyndall of Dublin demonstrated the formation of a "blue cloud" in a tube filled with air containing organic vapours through which a beam of intense light was passed, and refers to other experiments which have shown that volatile organic substances produced by plants behave in the same way. Went states that the amount of volatile organic compounds produced annually by all land plants and their decomposition products is of the order of one hundred million tons, and proceeds to outline some very interesting speculations as to the eventual fate of these substances. However, it is sufficient here to state that he believes that the blue haze is the first stage in the condensation of terpenes and other volatile plant products; that further condensation leads to the formation of what he terms "veil clouds"; that the bituminous and asphaltic particles so formed are returned to earth by rain or snow; and that this cycle may play an important part in heat conversions near the earth's surface and may provide the source materials for petroleum formation. Went ends with a plea for the further study of the "hitherto neglected blue hazes and veil clouds".

[1] *Nature (London)*, 1960, 187: 641 (August 20).

Abstracts from Medical Literature.

PSYCHIATRY.

Medico-Legal Aspect of Post-Traumatic Epilepsy.

I. N. PERR (*Amer. J. Psychiat.*, May 1960) draws attention to the frequency of epilepsy following head injury. He quotes Denny-Brown, who states that figures show that fracture of the skull is without importance in the question of epilepsy. He also quotes Penfield, "closed injury to the skull regardless of its severity rarely results in post-traumatic epilepsy. The likelihood of epilepsy is greatly increased in the case in which the dura has been penetrated and the brain lacerated." The author states that epilepsy rarely follows subdural hæmatoma, meningitis, or thrombosis. An epileptiform attack immediately after an injury does not denote that epilepsy will subsequently develop and persist. Injuries to motor, frontal and temporal areas give the highest incidence of epilepsy, while injuries to the occipital area and mid-brain are not characterized by such attacks. Infection associated with injury contributes to a higher incidence of epilepsy; epilepsy is also more likely when the period of post-traumatic amnesia is prolonged. As regards electroencephalography, the author notes that focal electroencephalographic abnormality is strongly suggestive of brain damage. Three months or more after a mild head injury a generalized abnormality of the electroencephalogram suggests that the abnormality anteceded the injury. The chance of a damaged brain showing a normal electroencephalogram is about 1 in 50. Paroxysmal abnormality three or more months after an injury strongly suggests epilepsy. If seizures and focal abnormality develop three or more months after an injury, the chances are three to one that the seizures are the result of the injury. The perplexing problem is how to establish a reasonable probability that a certain complaint will develop. The author concludes that in the case of a civilian head injury caused by a blunt instrument with penetration of the skull and dura, the incidence of epilepsy will not reach 20%; that two-thirds of the cases of post-traumatic epilepsy will develop within two years; and that the chances of this happening at a later date are about 7%. He emphasizes that post-traumatic epilepsy does not have the same prognosis as idiopathic epilepsy, and states that in post-traumatic epilepsy the course is often quite mild and the disease often disappears completely.

The Modern Treatment of Depressive Disorders.

F. A. FREYHAN (*Amer. J. Psychiat.*, June, 1960) presents a study involving the clinical investigation of 147 depressed patients (111 women and 36 men) and the use of five anti-depressive drugs. The author remarks that there seems to be a lack of agreement on many aspects of psychiatry including the effectiveness of electroconvulsive therapy, of psychotherapy, and of various therapeutic approaches. He states that psychiatrists tend to deal with different patient populations and are guided by contrasting conceptual frameworks. The assessment of the value of electroconvulsive therapy has been confused by the lack of agreement of what constitutes the spontaneous course of a depressive psychosis. It is generally believed that electroconvulsive therapy has greatly accelerated the recovery from depression. As regards anti-depressive drugs, the author states that it seems unreasonable to expect the same drug to calm the anxious, stimulate the apathetic, and inhibit the agitated and self-destructive patient. The subjects of the present investigation were all hospitalized patients. The symptoms are listed under the headings of behavioural, somatic, and experiential. The behavioural symptoms include withdrawal, listlessness, sadness, agitation, and self-destructive attempts. The somatic symptoms include disturbances of appetite and functional symptoms associated with depression. The experiential symptoms include guilt, lack of vitality, hopelessness, hallucinations and delusions. The five substances studied are grouped under the three headings: (i) monoamine oxidase inhibitors; (ii) phenothiazine derivatives; (iii) imipramine. The action of imipramine is selective and does not coincide with any diagnostic group, but most favourable results were obtained in the cyclothymic psychoses. Patients under 60 years gave better results than those over this age. Those who responded showed the first favourable response in 3 to 6 days on a dose of 150 mg. per day. The author notes that improvement is not associated with euphoria or over-activity; dizziness and mild tremor, and a feeling of weakness may be present in the early stages; disturbances in the field of vitality and psychosomatic functions tend to respond better than panic states, phobias, and nihilistic delusions. Studies with phenothiazine derivatives showed improvement in patients with panic and agitated states who suffered from severe insomnia. The monoamine oxidase inhibiting drugs were not conspicuous in their effectiveness. The author concludes that drug treatment of depressive states has the advantage over electroconvulsive therapy in that the patient is at no stage confused from the treatment, and is available for psychotherapy.

Murder without Apparent Motive.

J. SATTEN *et alii* (*Amer. J. Psychiat.*, July, 1960) discuss the problem of murder without apparent motive. They point out that in the assessment of criminal responsibility the law recognizes "sane" murderers who act upon rational motives which can be understood though condemned, e.g. killing for gain; the "insane" murderer is one driven by irrational senseless motives which may be associated with hallucinations and delusions; but there is a third group of murderers who seem to be rational, coherent and controlled, yet their homicidal acts have a bizarre senseless quality. The present paper is based upon the examination of four men convicted of bizarre senseless murders. All had been examined by psychiatrists prior to trial and were pronounced to be "without psychosis". The murderers themselves were puzzled as to why they had killed their victim. In no case were conventional weapons used, but bare hands or some convenient instrument was made use of. In all instances unnecessary violence was used and the assault on the body continued long after death. Frequent findings were erratic control over aggressive impulses, and inferiority feelings. Altered states of consciousness and feelings of dissociation were frequently noticed in connexion with outbursts of violence. Also in the historical background of each was the occurrence of extreme parental violence during childhood and evidence of severe parental emotional deprivation. Three of the four had a history of stuttering, an indication of the correlation of early speech difficulty with the ego's failure to develop mechanisms for delaying impulsive discharges or diverting impulses into ideational and verbal rather than motor outlets. During their examination it was noticed that these subjects showed disturbance of impulse control, that theirs was a rather brittle control, with an "all or none" pattern of functioning. Relationship to others was shallow; guilt and remorse were strikingly absent.

Psychodynamics of Consummated Maternal Incest.

C. W. WAHL (*Arch. gen. Psychiat.*, August, 1960) briefly reviews the attitudes towards incest through the ages, and comments on the rarity of reported cases. Only four instances of mother-son incest have been reported in the literature, and then only briefly. He records two further cases in which both men developed schizophrenia shortly after the incident. Many factors were considered to contribute to its occurrence, including absence of the mother during the formative period, a passive or absent father, overt maternal seduction, witnessing of a primal scene, and low intelligence.

Psychoses in Systemic Lupus Erythematosus.

M. STERN AND E. S. ROBBINS (*Arch. gen. Psychiat.*, August, 1960) have studied 53 patients with systemic lupus erythematosus admitted to the Bellevue Hospital over a period of eight years. At least half had associated psychotic reactions, but the majority of these were organic brain syndromes secondary to the disease itself. Steroids were implicated in producing a psychotic reaction in only a small minority, and the authors comment that mental disturbance is not a contra-indication to continue steroids if lupus is active. The psychotic reaction most frequently occurred during or immediately after an acute exacerbation.

Main's Syndrome.

H. BOURNE (*A.M.A. Arch. gen. Psychiat.*, May, 1960) illuminates the normal transactions in the therapeutic setting by briefly outlining the effect on a nurse in a psychiatric unit of a patient with Main's syndrome. (This rare syndrome is distinguished by the follies it induces in the patient's clinical attendants.) He advances the idea that these patients possess special aptitudes for stimulating infantile sexuality, and that the ordinary barriers between patient

and therapist which are breached include an incest taboo. Consistent with this feature is the constant occurrence in this and other reported cases of incestuous relationships which were long lasting and which have the uncanny facility for evoking incestuous feelings in others. Another feature is that the patient is usually a nurse or doctor's relative, and the clinician figuratively has to deal with a member of his own family. The author concludes that we should remember that not only is the clinician a parent-figure in the transference, but that the patient is his child in the counter-transference, and those with Main's syndrome are the children who have known too much.

REHABILITATION AND PHYSICAL MEDICINE.

Medical and Vocational Evaluation of Young Cerebral Palsied Adults.

SHYH-JONG YUE AND M. G. MOED (*Arch. phys. Med.*, April, 1960) state that since 1955, 157 young adults with cerebral palsy have gone through a work classification and evaluation project. Thorough medical examination, activities of daily living tests in physical and occupational therapy, psychometric studies, speech and hearing evaluations and psychiatric examinations were carried out first. Then the patients were subjected to vocational evaluation in a special cerebral palsy workshop for a period of seven weeks. Predictions were made as to employability as follows: 52% of the 157 patients would be employable; 14% would have borderline employability; 34% would be unable to enter the competitive labour market. In a follow-up study of 126 patients, it was found that 56% of those in the predicted employable group had over 25% of employment during the follow-up period, and that 94% of those predicted to be unemployable were unemployed. Of the individual medical test factors measured, only that concerning the physical therapy activities of daily living was significantly related to the vocational accomplishment; but the composite of both the physical and mental factors was more predictive of success than any one factor. There was some evidence that a minimal predictive score may furnish a basis for realistic prediction of job chances; but many immeasurable individual and chance factors enter into the achievement of vocational success.

Height and Weight of Brain-Damaged Children.

H. M. STERLING (*Arch. phys. Med.*, April, 1960) compares height and weight data of a group of children suffering from cerebral palsy (*a*) with those of normal siblings, and (*b*) with those of patients acquiring brain damage later in childhood. Patients with congenital or early-acquired brain damage were found to be significantly shorter and lighter than would have been expected either by comparison with siblings or by the use of standard anthropometric charts. The author comments that more careful studies of metabolic needs, intake, and incidence of fever or infection must be made before there is a satisfactory explanation of the findings. The theory of damage to a presumed growth centre or centres is a poor explanation in the absence of adequate data on other aspects of the condition.

Motor Nerve Conduction Velocity Studies in Poliomyelitis.

E. W. JOHNSON *et alii* (*Arch. phys. Med.*, May, 1960) have carried out motor nerve conduction velocity studies on 98 patients admitted with acute paralytic poliomyelitis to the Children's Hospital, Columbus, Ohio, in the latter half of 1958. They report their results, and discuss the value of this determination in the differential diagnosis of poliomyelitis. They state that the motor nerve conduction velocity in patients with paralytic poliomyelitis is within the normal range if the temperature in the extremity is normal. Determination of the motor nerve conduction velocity is an objective aid in differentiating acute infectious polyneuritis (Guillain-Barré syndrome) from acute anterior poliomyelitis. Reduced temperatures of paretic extremities can result in significant reduction of the conduction velocity.

Kinæsiology of the Temporo-Mandibular Joint.

S. I. SILVERMAN (*Arch. phys. Med.*, May, 1960) has studied the kinæsiology of the temporo-mandibular joint from the following aspects: (i) anatomical considerations; (ii) graphic tracings of the range of motion of a point on the mandible; (iii) cineradiography; (iv) electromyography; (v) neurophysiology. He states that there appears to be a high psychological component in all temporo-mandibular joint dysfunctions which is coupled with a basic organic dysfunction either in the joint or the teeth, or in both. The spasms associated with joint pain may be similar in character to those in the muscles associated with low-back pain. The sensory input associated with postural stability appears to be significant in causing and relieving the spasms. The loss of bilateral simultaneous stimulation associated with tooth occlusion can initiate a spasm, and conversely, the restoration of such simultaneous stimulation can relieve spasm.

Chlorophenylmethylthiazanone in Cerebral Palsy.

H. M. STERLING (*Arch. phys. Med.*, June, 1960) has investigated the use of "Trancopal" (chlorophenylmethylthiazanone), a muscle relaxant, in a group of four children, aged between two and four years, suffering from spasticity or athetosis, or both, affecting the control of the upper extremities. The children were given 100 mg. of the drug three times a day for six weeks. Comparison of each child's performance on a specially selected test designed to show possible improvement in rate of manual manipulation during the control period and the period of medication or placebo administration showed no significant change. Comparison of the patients' performance with that of the three children who received a placebo identical with the drug in appearance failed to reveal any significant difference which could be attributed to a drug effect. The author states that the selection of various activities representing approximately an equal level of difficulty for each child, even though the activities themselves are of widely differing character, allows an objective recording of performance which can be handled statistically, and minimizes subjective error and other extraneous factors which might otherwise influence the results.

Electromyographic Findings in Adult Myxœdema.

R. R. OZKER *et alii* (*Arch. phys. Med.*, July, 1960) present a report on the use of electromyography in 16 adult patients with primary or secondary myxœdema. Ten of the electromyograms were interpreted as abnormal, two as questionably abnormal, and four as essentially normal. The most typical findings in the abnormal electromyograms were "+" to "++" fibrillation potentials occurring at rest, increased irritability upon insertion and probing with the needle electrode, evidence of fatigue upon sustained contraction against resistance, and occasional bizarre trains of potentials which were frequently associated with cramping. In the electromyograms of four patients, "+" to "++++" fasciculation potentials were observed at rest, but two of these patients had, in addition to myxœdema, definite peripheral neuropathy. In no cases were denervation fibrillation or highly polyphasic fasciculation potentials seen.

Ultrasound, Hot Packs and Infra-Red Irradiation in Muscle Spasm.

F. P. FOUNTAIN *et alii* (*Arch. phys. Med.*, July, 1960) have used static force balance to measure the resistance to passive lateral flexion of the neck in patients with neck muscle spasm, and to passive extension of the leg in patients with poliomyelitis. The effect of hot packs, ultrasound and infra-red irradiation on this spasm was noted. All three techniques decreased spasm in both groups of patients. However, hot packs were significantly most effective in poliomyelitis, while ultrasound was significantly least effective in neck spasm.

Correlation between Fibrillation Potentials and Abnormal Chronaxies.

W. T. LIBERSON AND R. PAVASARS (*Arch. phys. Med.*, August, 1960) have carried out a study of 1620 muscles in 101 patients suffering from diffuse neuropathies, nerve injuries, anterior horn involvement from poliomyelitis or progressive muscular atrophy, and myopathies. They state that there is a high percentage of muscles showing fibrillation potentials when the chronaxie is above 20 milliseconds. The frequency of occurrence of fibrillation potentials greatly decreases for muscles with chronaxies below 20 milliseconds, and only 20% to 35% of muscles with abnormal chronaxies of 1 to 3 milliseconds were found to be fibrillating. Almost the same percentage of fibrillating potentials was found for muscles with normal chronaxies in patients presenting lower motor neuron disturbances. The authors discuss their findings in detail.

Brush Up Your Medicine.

THE MANAGEMENT OF EMPHYSEMA.

Terminology.

CLINICIANS, radiologists, respiratory physiologists and pathologists use a variety of definitions of emphysema and apply widely differing criteria to make the diagnosis. Only pathologists have unequivocal evidence to support their diagnosis, and for this reason alone emphysema is best defined in terms of morbid anatomy implying structural damage. The fact that the pathologist's diagnosis does not always correlate with the patient's clinical state and diagnosis is a problem for further investigation. A clinical and/or radiological diagnosis is frequently obvious but is often more difficult than the variety of alleged physical signs would suggest (Fletcher, 1952). Conversely, the alleged physical and radiological signs of emphysema may be present in normal subjects.

The importance of uniformity of definition and precise terminology has been stressed by Scadding (1959) and has led to specific recommendations by a Ciba Guest Symposium on this subject (1959). The latter advocated the use of the general term "obstructive lung disease" to obviate the diagnostic problems mentioned above; this term is qualified by "reversible" (partly or wholly) or "irreversible" as appropriate. The term "emphysema" may be used in the latter case when the symptoms and signs seem to indicate unequivocally the presence of permanent structural changes. The terminology and definitions set out in tabular form in the Ciba Symposium report are sufficiently simple in application to ensure a measure of clinical unanimity as to diagnosis. In summary, in the absence of other causes:

1. If the patient has cough and sputum only, he has bronchitis.

2. If his exercise tolerance is persistently reduced and unvarying in spite of treatment, he has irreversible obstructive lung disease or "emphysema".

3. If the patient has episodes of wheezing or a history of variability of exercise tolerance, he has "asthma" or reversible obstructive lung disease; if these are superimposed on a permanently impaired exercise tolerance, he has asthma plus "emphysema" or irreversible obstructive disease. If he has cough and sputum as well, then he also has bronchitis. As here defined, almost all patients with emphysema have some asthma, and most have some bronchitis.

Diagnosis.

The essential symptom of emphysema is persistent limitation of exercise tolerance[1]; without it clinically significant generalized emphysema is not present, whatever the other symptoms and signs. Of the physical signs, those allegedly indicative of a physical state may be largely ignored; those indicative of functional status are important. The latter include wheezing (sometimes only on full expiration), evidence of accessory muscle activity (notably on palpation of the scalene muscles, which are used well before activity occurs in the sterno-mastoid muscles), inspiratory narrowing of the subcostal angle (which implies a contracting but low, flat diaphragm contributing little to ventilation), pulsus paradoxus and large respiratory swings in venous pressure (suggesting high intrapleural pressure swings and hence the possibility of some reversible "bronchospasm" even when no audible wheeze is present) and central cyanosis. The last-mentioned sign is not detectable until arterial oxygen saturation is below 80%, by which stage the arterial partial pressure of oxygen is about half normal; cyanosis is therefore a late sign of hypoxia. Detection of a colour change on giving oxygen is a little more sensitive and is useful when accurate estimations are not available. In the latter stages, the signs of carbon dioxide retention, pulmonary hypertension and cardiac failure may develop.

Investigations.

Investigation follows the same lines as outlined for patients with bronchitis (Gandevia, 1960). Arterial gas estimations, particularly of carbon dioxide tension, are essential to the effective diagnosis and immediate management of acute or acute-on-chronic respiratory failure. Cardiac failure secondary to emphysema is excluded if the carbon dioxide tension is normal. The results of the simpler tests of ventilatory capacity afford a good objective index of severity and progress in ambulatory cases, but the assessment of diffusing capacity may provide a better index of prognosis. Sputum microscopy is necessary at intervals to avoid overlooking infection or eosinophilia.

Acute exacerbations of dyspnœa call for a further radiograph if only to exclude a spontaneous pneumothorax, but also to exclude pneumonia and other complications.

Management.

General Considerations.

In more severe cases, as with all chronic diseases, the chief problem is the maintenance of morale. There is no easy way of achieving this, but in a recent review of nearly fifty patients prior to inclusion in a clinical trial a special effort was made to find out why a few unhappy people were dissatisfied with their management. The findings were of interest from the point of view of management, although they do not necessarily do justice to their doctors (of whom I was one). In most cases the difficulties were attributable to inadequate explanation at or about the time of diagnosis. In a few instances the patients sensed, rightly or wrongly, the doctor's understandable frustration after a year or so of treatment to little avail ("he told me to have a holiday in Queensland, so I never went back!") and in two patients the ease of diagnosis led them to believe that their problem had not been adequately investigated. Of the patients who considered their condition had "never" been explained to them, two had been told that they had emphysema and had found it defined in a popular textbook as a progressive and invariably fatal disease; two others said that their fears of cancer and tuberculosis had not been dispelled. An observation made by most of the contented patients was that their doctor liked to see them at regular though often infrequent intervals; great reliance was placed upon these routine interviews. These comments are recorded not because patient's comments are necessarily accurate but because they emphasize that the successful management of emphysema is dependent on the management of the patient as an individual. It is essential that the patient understand his condition in some measure, much as in tuberculosis, and that he learn to adjust himself both physically and mentally to his reduced capacity for work and play. Patients who fail to learn to relax and to accept a measure of disability form the most difficult group to manage.

Much that has been said in regard to the general management of chronic bronchitis (Gandevia, 1960) is applicable to emphysema. Many patients with advanced disease are half-starved; an improved sense of wellbeing and a rise in hæmoglobin and serum albumin levels follow institution of a high protein diet.

The indications for antibiotic therapy are as for bronchitis, but they are also often indicated for persistent exacerbations of breathlessness. Such exacerbations are usually attributable either to broncho-pulmonary infection, when antibiotics are therapeutically necessary, or to "bronchospasm", which is frequently followed by infection. Severely emphysematous patients usually cough up little sputum in exacerbations, because coughing is tiring and inefficient, but infected sputum is the rule at autopsy.

Bronchodilator Therapy.

All patients with emphysema should be given continuous bronchodilator therapy because in over 90% of cases reversible bronchoconstriction is demonstrable with appropriate tests, even if it is not apparent from a history of wheezing or, more especially, of variability in exercise tolerance. There is evidence also that bronchodilator drugs reduce the work of breathing at ordinary tidal volumes, even if the effect on the forced expiratory volume at one second or maximum breathing capacity is small. It is often forgotten that, although the absolute increase in maximum breathing capacity may be only five or ten litres per minute, this often represents a 20% to 50% improvement on the initial values (average 28% in our series), a degree of improvement over a few minutes which is not obtainable in any other chronic progressive disease. Sometimes bronchodilators are given but stopped because wheezing is not audibly decreased, but as improvement may occur without decrease in audible wheeze (which is sometimes partly mechanical in origin), this sign should not be taken as a guide.

[1] Briefly, exercise tolerance is assessed according to the following questions: (i) Are you able to keep up with others of your own age up hills, stairs and at work? If not, (ii) are you able to keep up with others of your age indefinitely on the flat at an average pace? If not, (iii) how far, or for how long, can you walk on the flat at your own pace without a rest? The questions are asked (a) "when at your best" and (b) "when at your worst" to assess the range of variability.

Bronchodilator drugs should usually be given individually rather than combined in one tablet; the doses and times of administration are adjusted to the individual case. Many emphysematous patients are more short of breath in the mornings and early evenings than at other times; drugs are then given in these cases on waking and at afternoon tea-time and not "t.d.s. p.c.". Nocturnal wheezing is best combated by an aminophylline suppository 0·3 to 0·5 gramme inserted on retiring, together with a quickly acting drug to be taken if awakened. For "routine" use in ambulatory patients, "Theodrox", one or two tablets, choline theophyllinate ("Choledyl") 200 mg., both four to six hourly, are effective, and tolerance does not develop. Ephedrine 15 to 60 mg. (combined with phenobarbitone not exceeding 90 mg. per day) may be given two- to six-hourly in courses not exceeding five days. Tolerance to its bronchodilator effect develops after this, and although it may be overcome by increasing the dose, the cardio-vascular side effects become unpleasant. The frequency of tolerance is such that ephedrine should not be included in mixtures or tablets intended to be taken routinely for an indefinite period. Ideally, it is best prescribed "when necessary for wheeze or breathlessness", but another method is to alternate it with courses of a theophylline compound, changing around once or twice a week. "Orthoxine" is effective but expensive. Isoprenaline tablets to suck are effective but short-acting and have unpleasant local and general side effects in some patients. They are more suitable for patients with more dramatic episodes of wheezing, when they should be taken at the first sign of the attack and additional tablets sucked if necessary in an attempt to prevent further development of the attack. Any combination of isoprenaline and adrenaline is undesirable. The difference between the quickly and slowly acting drugs should be explained to patients, or they may be impressed only by the first group. Aminophylline, if not prescribed as "Theodrox", should be taken with magnesium trisilicate, "Amphogel" or similar substance, and should be given in doses of not less than 100 mg.

Bronchodilator "sprays" are a valuable aid for middle-aged and elderly patients with reversible bronchoconstriction superimposed on permanent changes, where the benefit gained outweighs any possible objections. With adequate instruction and other therapy the patient need not become utterly dependent on his inhaler. The alleged dangers of "adrenaline-fastness" and of facilitating infection or eventual structural changes are most likely a reflection of the fact that the patients who use inhalers regularly are those with the more severe and intractable disease. Adrenaline 1:500 to 1:200 with ephedrine 1:200 is a synergistic combination; atropine and papaverine are probably better omitted. The patient should have detailed instruction in the use of the more expensive models. Most of the hand inhalers currently available are inefficient, and many merely produce an illusion of vapour by ejecting large droplets at high velocity. Those which soak a hand held an inch or two away from the mouthpiece should be rejected; their beneficial effects are largely obtained by systemic absorption via the oropharyngeal mucosa. Much more efficient mists, with consequently lower dosage and fewer side effects, are produced by nebulizers designed for use with compressed air or oxygen or with a mechanical pump.[1] Bronchodilator aerosols for five minutes hourly or half-hourly are essential in the management of respiratory failure, but other routes and drugs should be used as well. Special forms of inhalers are used with "Norisodrine" and "Lomupren", both in powder form; both require a good strong "suck" and some intelligence for their proper use. Severely disabled patients may find the necessary inspiratory force difficult. The "Medihaler" (isoprenaline) gives a reasonably good mist and is easier to use, but all three variants are less efficient than a properly nebulized mist. Their advantage, as with other hand inhalers, is convenience; they should not be persevered with unless a few minutes after their use clear-cut subjective or objective evidence of improvement is available. Adrenaline 1:1000 given intramuscularly for severe exacerbations remains the most effective and popular drug. The initial dosage should be 5 to 10 minims, unless there is any contraindication, such as cardiac disease. If given subcutaneously the dose should be distributed north, south, east and west of the point of entry of the needle. Five-minim doses may be repeated as necessary, but in emphysematous patients, where considerable relief is not anticipated, further treatment is usually by other routes using the drugs previously mentioned. Intravenous administration of aminophylline is useful but has little advantage over the rectal route; aminophylline should not be used intramuscularly. "Bronkephrin" given subcutaneously is as effective as adrenaline and lacks the undesirable effects on blood pressure and pulse, and is therefore specifically indicated in patients with hypertension or cardiac disease. Bronchodilator therapy seems to impress the patients more favourably if associated with small doses (30 mg. twice daily) of amytal or phenobarbitone. Heavier sedation with morphine and pethidine is contraindicated because the ensuing respiratory depression aggravates or produces carbon dioxide retention, coma and, not rarely, death.

Steroids are rarely indicated in emphysema, except perhaps in severe respiratory failure and for trial in apparently emphysematous patients with sputum eosinophilia and with wheezing unresponsive to other drugs; in occasional cases of this type it gives unexpected relief. I have not been able to evaluate critically the effect of hydrocortisone by inhalation.

Aerosols containing "Alevaire" or other mucolytic agents are sometimes used to loosen sputum, but it is doubtful whether they are any more effective than water vapour or sodium bicarbonate solution. "Lomudrase" administered by hand inhaler or "Varidase" taken sublingually are alternatives also of unproven value clinically.

Physical Measures.

An important adjunct to the management of emphysema is physiotherapy, although there has been much clinically irrelevant argument as to whether its benefits are due to psychological or physical factors—irrelevant because patients treated by an experienced physiotherapist feel better and can do more. Physiotherapy has also been underrated because in the main it has been based on erroneous or outmoded physiological concepts, such as the alleged desirability of "expiratory mobilization of the diaphragm", of prolonging or forcing expiration to reduce lung volume, and of slowing the respiratory rate. The essential principle of physiotherapy is relaxation, which in itself allows the fullest possible use of the diaphragm (the most economical respiratory muscle), and ensures the smallest possible amount of inspiratory or expiratory accessory muscle activity, both of which are secondary aims of physiotherapy. The work of breathing is greatly increased in emphysema, and it is disproportionately increased the harder the patient tries to breathe. Increasing dyspnœa, is accompanied by fear, and fear, even in normal subjects, is accompanied by excessive activity of accessory muscles. Removal of fear—relaxation—makes breathing more economical and restores confidence by teaching the patient that he has some respiratory reserve. Breathing exercises, without undue prolongation of expiration, also help the patient to adapt his rate of work to the rhythm of his exercise and hence to hasten more slowly. Over-enthusiastic or inexperienced therapists can do harm by unduly slowing the rate or prolonging expiration or by attempting to eliminate all accessory muscle activity in a severely disabled patient; alarmingly chaotic and uncoordinated respiratory movements may follow. For example, it hopeless to attempt to eliminate all upper chest and accessory muscle activity in a patient with inspiratory narrowing of the subcostal angle; such a patient relies on upper chest movement to produce ventilation, and its removal produces panic. In less severe cases physiotherapists can influence the pattern of respiration in favour of the more efficient "abdominal" pattern.

Postural coughing night and morning is a useful manœuvre to teach patients with sputum or wheezing.

In a minority of patients with severe emphysema parts of the bronchial tree tend to collapse whenever expiration is active or forced, thereby increasing the expiratory obstruction. Some of these patients have learnt for themselves that expiration is aided by breathing out through the resistance offered by pursed lips. A 3-inch length of 3/16-inch rubber tubing—the length is adjusted by the patient to provide a little more resistance than he feels is necessary—is better than the lips, and is used, for expiration only, when he has to undertake any exercise. This simple device may be tried in all severely disabled subjects; it will be discarded by those in whom expiratory bronchial collapse is not a feature.

Other physical methods of aiding ambulatory emphysematous subjects are pneumoperitoneum, abdominal belts and intermittent positive pressure breathing. The first two have dropped out of fashion, probably because they benefit

[1] These include the Wright or Collison inhaler, or the plastic nebulizer specially designed for use with "Alevaire". For use in the home or in hospital a small portable pump (which can also be used for suction) is made by Repco Pty. Ltd. Expense is a problem with any of these more efficient techniques, and the apparatus cannot be carried in the pocket.

relatively few patients, but it may be possible in the future to select appropriate patients and to measure the effects of these methods; some work along these lines has already been done. Intermittent positive pressure breathing, using a simple and efficient machine such as the Bird, is, I understand, a popular domestic measure in the United States. Whilst certainly a most efficient method of administering a bronchodilator drug, it is difficult to see how any long-term benefit can be achieved and equally difficult to design a critical trial to assess its value. In any case expense will greatly restrict its use in this country. In hospital it may be a useful adjunct for the convalescent, and it is harmless provided a pressure of 20 cm. of water is not exceeded, and provided the inspired gas (air, or air-oxygen mixture, not 100% oxygen) is efficiently humidified.

A suitable walking frame makes the life of almost bedridden patients more tolerable, in that it allows them to walk about the house and for short distances outside with considerably less distress than would otherwise be possible (Campbell, 1957).

Surgery.

"Emphysematous" cysts are not in themselves an indication for surgical intervention, but in certain circumstances their removal is attended by significant improvement in exercise tolerance and pulmonary function. Occasionally cystic changes occur (usually in relation to a scar) in an otherwise normal lung; there will be no symptoms of pulmonary insufficiency, and surgery is not indicated except for recurrent pneumothorax. However, in a minority, the cyst occupies half or more of one hemithorax, in which case it seems undesirable to have relatively normal lung virtually collapsed for an indefinite period without some attempt to allow it to reexpand. Mediastinal shift towards the opposite side during deep inspiration, suggesting ventilation of the cyst via a relatively large bronchial communication, is an indication for operation, but this phenomenon is rare.

More commonly, bullæ occur on a background of generalized emphysema such that the patient's exercise tolerance is significantly limited, mainly by the emphysema. If the cyst or cysts are large, removal may be associated with improvement, but this is limited (*a*) because the disease is essentially widespread and (*b*) because the lung expanding to occupy the space created is already diseased. The more severe the patient's disability the greater the indication for surgery; patients with an exercise tolerance of 200 yards or less on the flat will notice and appreciate a small improvement which would be negligible and disappointing to a patient able to walk a mile. In general, operation should be withheld in the latter patient until his exercise tolerance deteriorates further.

Most bullæ of this type are not ventilated during ordinary breathing, the air within them being derived from collateral alveolar ventilation and not from a relatively large bronchial pathway. In the minority only, some of each breath passes in and out of the cyst. This air is wasted, for no gas exchange takes place, and, especially on exercise, the patient has to hyperventilate to distribute enough air to functional parts of the lung. This is a serious disadvantage to the emphysematous patient whose ventilatory capacity is already poor. Removal of the cyst in these cases produces benefit in two ways—by allowing functionally better tissue to make use of the space and by eliminating the need for superfluous ventilation.

Bullæ are recognized radiologically; whether they are single or multiple, unilateral or bilateral, need not influence the decision in regard to surgical attack on one or more. Ventilation of the cysts may be suspected if disability is greater than ventilatory capacity suggests; mediastinal shift and "lightening" of the cyst on fluoroscopy are not necessarily apparent, and bronchospirometry is usually indicated.

The care of the emphysematous patient before and after any surgical operation is important in the prevention of post-operative complications. Bronchodilator drugs are essential before and after operation, the period of operation and of "nil orally" being covered by aminophylline suppositories given six-hourly, with aerosol or intramuscular adrenaline or subcutaneous "Bronkephrin" if necessary. Smoking must be stopped; this with postural coughing and a minimum duration of operation are the chief factors which reduce the volume of sputum produced in the post-operative phase (MacDonald, 1959). Doses of any respiratory depressants, including barbiturates and "Omnopon", must be kept to a minimum. Pethidine, though not ideal, is preferable to morphine, and paraldehyde or chloral to barbiturates. Local anæsthesia is preferred to assisted respiration methods only when it is certain that large additional doses of analgesics or "Pentothal" will not also be given. Furthermore, severely emphysematous patients will not tolerate lying flat for long periods. Post-operatively any respiratory obstruction, however slight, and whether due to posture or secretion, must be treated promptly and efficiently. Indeed hypoventilation for any reason must be quickly corrected as these patients lack tolerance to the mildest respiratory insult. In severely emphysematous patients with anoxia and carbon dioxide retention, there is a case for simultaneous tracheostomy when abdominal surgery is unavoidable.

Respiratory Failure and Cardiac Failure.

Respiratory failure is present when arterial gas tensions are abnormal—that is, when oxygen saturation falls, with or without carbon dioxide retention. Exacerbations of bronchial infection and of reversible bronchoconstriction are the chief causes of acute (or acute-on-chronic) failure. Only the principles of management can be mentioned here.

1. Oxygen therapy. Oxygen is essential. If conventional methods of administration (a "Polymask", properly applied, or nasal catheters, are preferred to an oxygen tent) lead to drowsiness or coma, with a clinically obvious fall in pulmonary ventilation, then it must be given by intermittent positive pressure. Reliance should not be placed on the machine's ability to produce effective alveolar ventilation if it is used with a face mask. If positive pressure methods are indicated, then a tracheostomy is also desirable unless the factor precipitating failure is one which can be controlled within a few hours (e.g., oversedation). Tracheostomy alone facilitates the elimination of carbon dioxide by reducing dead space and the work of breathing; it also allows some direct attack on retained sputum, which, if not present at the outset, inevitably develops. All supplied gas mixtures must be humidified.

2. Reduction in the work of breathing. Apart from antibiotics and tracheotomy, bronchodilator drugs are the chief method of reducing the work of breathing which in these cases contributes significantly to total body oxygen requirement and carbon dioxide production. Full doses of aminophylline and adrenaline, or similar drugs, by more than one route are essential. Intravenous administration of hydrocortisone may also be beneficial, subsequent oral exhibition of steroids being continued in the usual way.

Respiratory stimulants, except to combat respiratory depressant drugs, are probably best avoided unless frequent blood gas analyses are available. Any increase in ventilation is often offset by a disproportionate increase in respiratory work, so that the net effect is further carbon dioxide accumulation and anoxia. At least they should never be given without bronchodilator drugs. Of the stimulants, "Coramine" (5 to 10 ml. given intravenously hourly or so) has the advantage of producing coughing.

The essential feature of the management of the cardiac failure secondary to emphysema is the energetic treatment of the pulmonary disease. Digitalis and diuretics are valuable but of secondary importance compared to the relief of anoxia in particular. "Diamox" has no special value in these cases, and our experience of "Daranide" has so far not been as encouraging as overseas reports suggest.

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Out of the Past.

SUPRARENAL EXTRACT.[1]

[From the *Australasian Medical Gazette*, March 20, 1902.]

CONSIDERABLE attention has been recently directed to the therapeutic properties of supra-renal extract. It acts as a powerful stimulant to involuntary muscle, which it seems capable of affecting both directly and through the medium of the nervous system. Its principal physiological effects, so far recorded are, (1) elevation of blood pressure, secondary to constriction of the arterioles; (2) retardation of the pulse rate; (3) increased force of the cardiac systole; (4) blanching of tissues when applied locally. Until comparatively recently its use was restricted to cases of Addison's disease, in some of which its exhibition was attended with satisfactory results, but further investigation of its physiological effects has led to its adoption as a promising remedy in cases of dilatation of the heart, exophthalmic goitre, and cardiac failure. In experiments conducted by Mankowski of St. Petersburgh, it was found that 30 seconds after cessation of respiration and cardiac action from chloroform inhalations, an intravenous injection unfailingly resulted in producing resuscitation. Its greatest successes so far, however, have been achieved from its local application. In epistaxis, metrorrhagia, and other forms of hæmorrhage from surfaces that can be reached it may be counted upon as a powerful astringent and hæmostatic. But in internal hæmorrhages, hæmatemesis, hæmoptysis, hæmaturia, etc., its administration by the mouth is credited with surprisingly successful results. When instilled into the eye it produced within one minute complete blanching of the ocular and partial blanching of the palpebral conjunctiva, and from a similar effect on the other mucous membranes, it is recommended in cases of coryza, hay fever, tonsillitis, and other affections, attended with capillary congestion. Its ascertained properties suggest it as useful for careful trial as a hæmostatic. It may be given in tabloid form as a dried extract, but recently the active principle has been extracted in a pure form by Dr. Jokichi Takamine, and is now in the market under the name of "Adrenalin". It is a stable substance which occurs in the form of minute white crystals, has a slightly bitter taste, and is soluble sparingly in cold, but readily in hot water.

[1] From the original in the Mitchell Library, Sydney.

Clinico-Pathological Conferences.

A CONFERENCE AT SYDNEY HOSPITAL.

A CLINICO-PATHOLOGICAL CONFERENCE was held at Sydney Hospital on March 15, 1960. DR. E. HIRST was in the chair, and DR. B. LAKE was the principal speaker.

Clinical History.

One month before his admission to Sydney Hospital, a grazier, aged 68 years, from the Scone district of north-western New South Wales, presented himself to his doctor with cough and right-sided chest pain. He had been mildly diabetic for some years, on 10 units of globin insulin a day, which had been "recently" discontinued, the patient then being "controlled by diet alone". For about two years he had had occasional "dizzy turns and blackouts".

The patient's chest was clinically normal; a large mass, thought to be spleen, was present in the left hypochondrium. No abnormality was found by rectal examination. There was no occult blood in the fæces. Examination of the peripheral blood gave the following results: hæmoglobin value 13·8 grammes per 100 ml.; leucocytes 3000 per cubic millimetre (neutrophils 70%); film, normal. Chest X-ray examination and intravenous pyelography showed no abnormality; a barium-enema X-ray examination was reported on as follows:

> Barium flowed normally to the upper end of the descending colon and there was considerable delay in its passage to the transverse colon. This could be due to external pressure but the appearance is more suggestive of involvement of the colon in the newgrowth which may have originated outside the colon. I could not feel a notch in the mass.

On his admission to hospital, the patient complained of lassitude and weakness for a few months, also of occasional chest pain and a little breathlessness when lying down, unless lying on the left side. Examination showed a large irregular fixed mass in the left hypochondrium, which did not move with respiration. The blood pressure was 115/75 mm. of mercury; the urine (specific gravity 1018) contained no abnormal constituents; the blood count and film were normal. X-ray examination of the chest and a plain X-ray film of the abdomen showed no abnormality; the left renal outline was noted to be lower than the right.

On the afternoon after his admission to hospital the patient had an attack of unconsciousness; he was insensible to all stimuli, the eyes were staring, the breathing and pulse were rapid, the skin was dry, the pupils were contracted. Glucose was given by mouth, and fifteen minutes later the patient was much improved. It was then found that he had had neither breakfast nor lunch that day. A similar attack occurred four days later when the patient had been fasted for a barium enema X-ray examination; he was treated as before, and with similar result.

Laparotomy was then performed. A large left-sided retroperitoneal mass was found in the region of the splenic flexure, passing upwards behind the stomach. It was considered inoperable, and radiotherapy to the left upper quadrant of the abdomen (150*r*) was commenced.

One week after the operation the patient became vague in manner, disorientated, apathetic, depressed and anorexic. Early one morning, four weeks after operation, he fell out of bed. He was found unconscious, with staring eyes and unresponsive to stimuli, but performing some movements of the limbs. The blood pressure was 115/75 mm. of mercury. The breathing was rapid and stertorous. The pupils were contracted and reacted sluggishly to light; the head and eyes deviated to the left; muscle tone was greater and deep reflexes were more active on the left side. A few hours later the patient died.

Clinical Discussion.

DR. B. LAKE: The recent moves to process medical data, to compact its vast nosology so as to arrive at speedy diagnosis by a computer, have not been realized in time to render this conference obsolete. I had hoped to code the protocol, bring in a computer and leave it to beep and click the right answer. According to Ledley and Lusted, who have done much of the groundwork towards this end, and who analysed many of the C.P.S.'s in *The New England Journal of Medicine*, "the fundamental formula of med. diagnosis" is a Boolean function, *f*, that satisfies the formuls $E\text{-}(G\text{-}f)$. This means given medical knowledge, *E*, then if patient presents symptoms *G*, he has diseases *f*. They go on to state that a solution *f* always exists! Would that the real situation mimicked that in symbolic logic! Unfortunately also, symbolic logic has not invented a calculus to deal with the *E* carried between the ears.

In real order, we always start with the symptom complex. A 68 years old man presented first with right-sided chest pain of unstated duration. A month later lassitude and weakness were primarily elaborated as well as occasional chest pain. There was now some dyspnœa on lying down, relieved by lying on the left side. No other immediate symptoms are noted. In the past history we note that he had been a mild diabetic for some years, but recently was able to discontinue insulin. The diabetic state was probably no more than a tendency, as he had been controlled on 10 units of globin insulin a day. Whether he discontinued insulin because of boredom, the absence of glycosuria, or because of normal blood sugar levels, we do not know. Let us note that absence of glycosuria is not an infallible guide, especially in the depressed renal function that accompanies diabetic nephropathy, and may lead to a dangerous complacency in the face of persisting diabetes. We are left to ponder whether "the control by diet alone" was because of anorexia and/or deliberate weight loss.

On first examination, the chest was clinically normal, but a large mass was present in the left hypochondrium. This is an impressive and positive finding. It continues to dominate the clinical picture, being recognized by two

clinicians, two radiologists and finally visualized at laparotomy. Despite the fact that the first observer thought it was a spleen, he made a rectal examination and had a test for occult blood made on the fæces. These revealed no abnormality. This leads us to hold tentatively that there was no lesion of the prostate or rectum. The absence of occult blood in the stool, with a gut neoplasm large enough to be palpated and be taken for the spleen, would also seem unlikely.

At this stage we have to consider a vast number of possibilities in terms of both pathological lesions and sites of origin:

Organ or Tissue.	*Lesion.*
Spleen	Aneurysm
Gut:	Hæmatoma
Stomach	Abscess
Small gut	Cyst (including hydatid)
Colon	
Mesentery	Phlegmon
Omentum	Reticulosis
Pancreas	Neoplasm:
Kidney	Simple
Suprarenal	Malignant sarcoma
Lymph nodes	(Primary)
Nerves and ganglia	(Secondary)
Retroperitoneal tissue	Parasites.
Diaphragm	
Liver	
Blood vessels	

The second observer, a radiologist, noted no abnormalities in an intravenous pyelogram. At barium enema, he found that barium flowed normally to the upper end of the descending colon, where there was considerable delay in its passage to the transverse colon. He tried, as we all do when uncertain, to have the best of all the likely situations, i.e., the delay "could be due to external pressure, but is more suggestive of involvement of the colon"; he jumps, diagnoses new growth which, uncertain still, "may have originated outside the colon". No notch was palpable. I take it he does not consider the mass a spleen; that he really believes the mass is new growth originating outside the colon which has encircled it.

Now if the observations were exact, this mass must have enlarged considerably in the next month. The mass did not then move with respiration. This is not of much help, as a large spleen adherent owing to perisplenitis will not move with respiration. Whereas initially there was a cough with right-sided chest pain, one month later there was dyspnœa on lying down, except on compression of the left side, suggesting that the use of the unsplinted left chest was a hazard to easy respiration. The mass was then noted to be irregular. Finally intravenous pyelogram revealed no abnormality, yet the plain X-ray of the abdomen one month later disclosed that the left renal outline was lower than the right; surely worthy of comment as the reversal of the usual finding. So I estimate that there has been considerable enlargement of the mass over a month.

Replication or extension of special tests does not get us any closer to an answer. Thus the hæmoglobin and blood film on two occasions were normal; the first count introduced the familiar false lead in a leucocyte count of 3000 with a neutrophil count of about 2000 apparently not confirmed. On the second test the urine showed a specific gravity of 1018, an index of some residual concentrating power, and was said to contain no abnormal constituents. Presumably this means that there was neither glucose nor albumin present.

Laparotomy was finally performed. A large, left-sided retroperitoneal mass in the region of the splenic flexure, passing upward behind the stomach, was noted. Presumably a biopsy was taken and will yield the answer. The mass was considered inoperable, i.e., impossible to dissect. Radiotherapy was then commenced, probably with the hope of reducing the mass rather than of effecting a cure. This still does not offer a diagnostic solution, for whilst deep X-ray therapy is mainly used for neoplasms, it has been successfully used in chronic inflammatory masses.

We are forced to seek other clues. For about two years he had had occasional "dizzy turns and blackouts"—no further information. Dizzy turns and blackouts are among the most protean of symptoms. Here we have no guide in terms of things to come as to whether the dizzy turns were due to being out in the noonday sun, and the blackouts near memory blanks; perhaps they were evidences of hypoglycæmia due to overdosage with insulin, during the time that his diabetes was coming under apparent control. I take it the symptoms were initially offered and accepted in a casual outback way as the rounding out of the list of symptoms.

However, on the afternoon following admission, the patient became unconscious, was insensible to all stimuli, the eyes were staring, breathing and pulse rapid, the skin dry, the pupils contracted. He remained profoundly unconscious until oral glucose was given. Fifteen minutes later he was much improved. It was then found that he had had neither breakfast nor lunch that day. The immediate assumption was that he must be severely hypoglycæmic and responded to appropriate treatment. As if to prove the point, a similar episode occurred four days later when he missed breakfast and responded to the same treatment.

One week after laparotomy and the start of deep X-ray therapy the patient became vague in manner, disorientated, apathetic, depressed and anorexic. He remained in this state for a further three weeks, when he was found unconscious by the bed with staring eyes, unresponsive to stimuli, but working his limbs. The breathing was rapid and stertorous, the pupils were contracted and reacted sluggishly to light. The head and eyes deviated to the left, muscle tone was greater and deep reflexes more active on the left side. The blood pressure was again recorded as 115/75, the same as on admission. No comment was made about any obvious head injury. A few hours later he died.

Let us from this group of data rule out the unlikely. These were obviously not attacks of diabetic coma, because of speed of onset, mode and speed of relief. They were obviously not attacks of hypertensive encephalopathy or of uræmic coma. There was no hypertension. The relief of coma was prompt after the use of glucose and urinary concentrating power was adequate. The preterminal phase of apathy, etc., was hardly likely to be the result of the relatively small dose of deep X-ray therapy delivered, but is consistent with the cachexia of wasting diseases and/or dehydration and/or hypoglycæmia. The relief of coma was so prompt after the use of glucose that I feel we must accept these attacks as being attacks of hypoglycæmic coma.

The pattern therefore must be considered under the causes of fasting hypoglycæmia. The only negative features in this regard are the dryness of the skin noted on each occasion. All the other findings have been described as occurring in marked hypoglycæmia. Severe renal glycosuria can be immediately dismissed, as also that due to anterior pituitary deficiency, because of the lack of headache and visual disturbance. Likewise the lesions of the hypothalamus and brain-stem are dismissed because of no recording of any suggestive symptoms. That due to adrenocortical deprivation must be more seriously entertained. The onset of Addison's disease in diabetes is well authenticated, and whilst the two may coexist, the usual pattern when the diabetic state is prior in time is an apparent repair of the diabetic state with diminishing insulin requirements. This is because of the extreme sensitivity to insulin in a condition where glucocorticoid production is depressed or absent. The Addisonian is typically prone to the effects of mild dehydration and food deprivation. The crisis usually consists of extreme weakness, marked mental changes, increase in the gastro-intestinal symptoms, diarrhœa and vomiting, but coma except terminally is very rare. Blood pressure in Addison's disease, of course, is always low due to sodium depletion, as it is low here. No comment has been made of increasing buccal or general pigmentation, of weight loss or of the obligatory gastro-intestinal disturbances. Further, one would wish that the treatment of Addisonian crises was as easy as here on the first two occasions.

The next type of hypoglycæmia to be considered is that due to hepatic disease or porto-caval shunt. This typically occurs with generalized affection of the liver, especially in advanced cirrhosis or circulation disturbance which leads to porto-caval shunt. Hepatic coma is not repaired by the use of glucose, and in fact the blood-sugar levels are usually normal in hepatic coma. Lapse into coma is usually insidious. The protocol gives us no reason to believe that there are any of the stigmata of liver failure or by-pass. It has been reported that hypoglycæmia occurs in hepatic dysfunction, e.g., congestive cardiac failure, but rarely.

Were these attacks due to increased circulating insulin as from a functioning islet-cell tumour? We think not. The person with such a tumour is always hungry, and often when the diagnosis is not made early enough, the patient tends to become obese from his compulsive calorific excesses.

Hypoglycæmic attacks tend to be of the stimulative type, with marked outpouring of insulin following the intake of food, leading to further hypoglycæmia and so calorific excesses. Behaviour disorders commonly occur early and may dominate the picture. It is unlikely that the patient would have been able to miss one meal, let alone two.

Finally, there is a group of select tumours, numbering less than twenty in the literature, in which hypoglycæmia has been associated with the presence of a rapidly expanding, usually retroperitoneal tumour, sometimes thoracic.

We are now at the stage of deliberation where we must combine the one set of findings relating to an abdominal mass with the other set, relating to attacks of coma which are clearly of the starvation hypoglycæmic type. With regard to pathological lesion, I have advanced reasons for my contention that the mass was probably increasing rapidly in size. One would not entertain aneurysm; with an aneurysm as large as this mass, there would have been some comment on it being pulsatile; it might have been filled with clot, and this would have rendered its pulsatile quality less. This would exclude phlegmon, abscess, cysts, hæmatoma because of the absence of concomitant inflammatory signs including pain, fever and so on. With a hæmatoma of the size of this mass, there would have been some indication of anæmia or a blood dyscrasia, bleeding elsewhere, perhaps of reticulosis; none of these are mentioned in the protocol. Cysts might increase rapidly in size, but would not have required radiotherapy or have involved the splenic flexure as this mass was noted to do. They may become adherent if surrounded by inflammation and may simulate neoplasms; however, generally they give a plain rounded shadow in the plain X-ray film of the abdomen, and are usually clearly defined by barium studies and seen to be exclusive of the gut. From time to time ascariasis leads to a diagnostic conundrum; in this case it lacks substantiation. The only possibilities were therefore reticulosis and neoplasm. Reticulosis must be seriously considered. The mass being a spleen has been considered; the failure to feel a notch does not exclude it being a spleen. If this is a reticulosis, it would have arisen primarily in the retroperitoneal lymph nodes, in the lymph nodes of the omentum or in the spleen. At the late stage of the disease, there is still no evidence of spread beyond the peritoneal cavity. This does not exclude reticulosis; but if it were abdominal Hodgkin's disease, one would expect generalized symptoms to occur.

Here we must apply our consideration of the hypoglycæmic episodes. Those that seem at all reasonable to suggest are as follows. Firstly, adrenocortical insufficiency. It is well known that the adrenals may be completely replaced by metastases, especially from carcinoma of the bronchus or breast or melanoma, and this will lead to a more or less typical Addisonian state if the adrenal destruction is complete. As already indicated, there are reasons for rejecting these attacks as being due to adrenocortical insufficiency; besides which, we would be left to explain an enormous left-sided tumour without anything like the equivalent on the right side. Secondly, hepatic coma might equally fit this description, but would require either definite liver disease or massive liver replacement by tumour, and there is no indication of the presence of either here. Thirdly, islet-cell tumour of the pancreas fulfils many of the criteria. However, if functioning, the amount of insulin produced is roughly proportional to the size of the tumour, and this would have been an enormous islet-cell tumour and would have produced much more violent reactions earlier. I find that I am driven to postulate as the diagnosis that this mass was none other than the mysterious retroperitoneal or thoracic tumours associated with hypoglycæmia. These tumours typically expand rapidly, but the amount of hypoglycæmia produced does not appear to have the same proportions to size as the islet-cell tumours. Pathologically, these are a polyglot group ranging over fibroma, rhabdomyosarcoma from the diaphragm, pseudomyxoma and mesothelioma of the peritoneum and in one instance a neurilemmoma. The common factors appear to be rapid expansion with large-volume visceral displacement and pressure on the posterior parts of the abdomen or thorax. The mechanism by which they produce hypoglycæmia or are associated with it is still uncertain. In only one instance has the tumour been submitted to direct investigation, and here it was found that various parts of the tumour had strong insulin-like properties. Other postulations have been excessive glucose utilization by the tumour, or an autonomic effect by blocking sympathetic impulses to the liver (a mechanism demonstrated only in animals).

The first explanation seems more likely, as removal of the tumour cures the symptoms and its recurrence with small metastases is accompanied by as severe a degree of hypoglycæmia as in the first instance. My diagnosis, then, is that this is such a tumour, and I base it on the best fit consistent with the facts of the protocol. It is at moments like these one feels the need of the new computers.

DR. R. G. LEWIS: The things which puzzled me are the attacks of hypoglycæmia with such a large mass, and the fact that they were reduced by glucose can neither be neglected or discounted. However, the attacks in my opinion, are certainly not typical of hypoglycæmia. Not all patients sweat, but a large number do. As regards the actual diagnosis, I was trying to find two separate causes. Firstly, I was prepared to regard the large mass as a reticulosis, and because of its area a lymphosarcoma or a reticulum-cell sarcoma. Dr. Lake's objections as regards the absence of pyrexia I think applied quite well to Hodgkin's disease, but not necessarily to the other two suggestions made. However, when I came to the end of the story, I wondered whether this man had injured himself when he fell out of bed and developed a lesion such as subdural hæmatoma in the region of the right cerebral cortex. I would like to thank Dr. Lake for bringing to my notice a condition of which I had not heard before.

DR. P. FRANCIS: Dr. Lake has made one of the rarest diagnoses ever at a clinico-pathological conference, and one with which I cannot disagree. I wondered what was the source of his information about the cause of hypoglycæmia in these tumours. I know of one case report of retroperitoneal sarcoma with hypoglycæmia in which the tumour was analysed for insulin and found to have no insulin activity. Other cases have been recorded where histochemical staining reactions suggested insulin-secreting properties, and on this basis it was suggested that these were not retroperitoneal sarcomas, but atypical islet-cell tumours.

In the case under discussion, if this is in fact an islet-cell tumour, it must be the largest anybody could ever imagine, and therefore I think Dr. Lake's suggestion is more likely to be correct.

Pathological Findings and Discussion.

DR. HIRST: The patient had been a thin, tall man 6 ft. 1 in. tall, and at post-mortem weighed 140 lb.

Situated in the left upper part of the abdomen, behind the peritoneum and occupying the position of the tail of the pancreas, there was a large (18 by 18 by 15 cm.) ovoid lobulated new growth weighing 1020 grammes. The surface was smooth and mottled dark purple and pale yellow. The cut surface showed the same colour, and there were areas of necrosis and liquefaction. The growth did not infiltrate the tissues of the posterior abdominal wall, being readily separated from it by a plane of cleavage. The splenic flexure was adherent to the anterior surface of the growth and displaced forward by it. However, the growth did not appear to infiltrate the wall of the colon, which may possibly have been separated from the growth without serious damage to it.

The liver was greatly enlarged, and contained three pale yellow nodules of growth not visible from the external surface. The largest measured 8 cm. in diameter, and was situated in the substance of the right lobe. In addition to these yellow nodules there was also a smaller friable nodule in the left lobe measuring 1 cm. in diameter. Several similar small nodules were found in the spleen. No involved lymph nodes were found.

The head of the pancreas was normal. However, the body of the pancreas was absent. The head of the pancreas was thus joined to the growth, which replaced the tail, by a thin bridge of retroperitoneal adipose tissue.

Other relevant findings were: the left adrenal was not found, being probably replaced by or entirely attenuated by the growth. The right adrenal gland weighed 10·8 grammes, indicating probably compensatory hyperplasia.

The thyroid gland was enlarged to about twice its normal size by a colloid goitre.

The colon showed melanosis, especially in the splenic flexure. There was hypostatic congestion of both lungs and occlusive atheroma of the left coronary artery. There was no evidence of myocardial infarction.

There was no ascites. However, all the intraabdominal veins were greatly dilated.

Microscopic examination of the growth showed the appearances typical of islet-cell tumour. Anaplasia was absent, but mitoses easily found in some sections. There was thrombus in many of the small vessels of the growth,

and large areas of the growth were necrotic. The appearances of the liver metastases were similar to that of the main growth, showing no anaplasia of note.

The splenic flexure was adherent to the growth by fibrous tissue along the serosa, and the growth did not infiltrate into the wall of the bowel. The small nodules in the liver and spleen consisted of a necrotic centre with a condensation of fibrous tissue at the periphery. We were unable to determine the nature of these nodules, and at present entertain the possibility that the nodules were necrotic, probably metastases of the islet-cell tumour.

The head of the pancreas showed a few hyalinized islets. Most islets were normal. There was no evidence of islet hyperplasia.

In the adipose tissue, replacing the body of the pancreas there were a few remaining ducts surrounded by proliferated strands of islet cells (nesidioblastosis).

The main histological change in the lungs was suppurative bronchiolitis. In the cerebral cortex there was satellitosis of the neurons and scattered glial nodes typical of brain damage accompanying some islet-cell tumours.

It only remains to add that there was no gross or microscopical evidence of any tumours of the parathyroids, pituitary or right adrenal. There was no evidence of past or present gastro-intestinal ulceration. The above lesions have been recorded with islet-cell tumours.

Pathological Diagnosis.

1. Large functioning islet-cell carcinoma of the tail of the pancreas following spontaneous remission of diabetes mellitus. Metastases in liver. Doubtful necrotic metastases in liver and spleen.

2. Atrophy of the body of the pancreas.

Obituary.

EDWARD DENIS AHERN.

WE are indebted to DR. P. J. KELLY for the following account of the career of the late Dr. E. D. Ahern.

While feeling that my literary abilities are inadequate, I am honoured to write about my friend, the late Dr. Edward Denis Ahern, a graduate of the Melbourne Medical School, a Fellow of the Royal Australasian College of Surgeons, and an Honorary Fellow of the Royal College of Surgeons of England. He died in Brisbane on October 11, 1960, after being in ill health for two years; his final illness lasted four days. He will be a great loss, as he worked hard for the honour of the medical profession.

Edward Ahern was born in Charleville, Queensland, on July 7, 1888. He was educated at Nudgee College, and started his medical course at the University of Melbourne in 1906. He was a keen Rugby Union footballer, and as a student tried to keep the game alive at the University. In 1909, a team of Californian university students visited Sydney to play against our universities. Melbourne University Football Club was asked to send a team to Sydney, and Ahern was captain of the team sent. His team played well, considering their great lack of match practice. It would be difficult to get such a Rugby Union football team in Melbourne these days.

He graduated in 1910, and became a resident medical officer at the Brisbane General Hospital in 1911. He was acting superintendent at the Brisbane General Hospital in 1912. In 1913 he started practice as a surgical specialist on Wickham Terrace, Brisbane, and no doubt he was the first at his age ever to make such a venture. All the other doctors on Wickham Terrace, except W. N. Robertson, an ear, nose and throat surgeon, and Walter Gibson, an eye specialist, were general practitioners, but did whatever surgery they felt capable of doing. One can imagine their feelings about Ahern when he started practice amongst them as a surgical specialist, after two years' general hospital experience. Ahern was well trained in his early days, and had no trouble in mixing with his elders on Wickham Terrace. He soon became well known for his surgical ability, and was one of Brisbane's leading surgeons. He was a keen and natural surgeon, being taught by three good surgeons in Melbourne—M. U. O'Sullivan, Jerry Moore and G. A. Syme—and later by E. S. Jackson and Meek at the Brisbane General Hospital. Syme eventually was instrumental in founding the Royal Australasian College of Surgeons. At that stage, Ahern was a surgeon of repute both in Brisbane and in the southern States, and readily became a Foundation Fellow. He was president of the College in 1941-42; that was a big effort in those days, requiring frequent trips to Melbourne from Brisbane. At that period he had to attend a meeting in Adelaide; he chartered an aeroplane, and flew direct from Brisbane to Adelaide. Captain Ron Adair was the pilot, and I doubt whether such a trip had ever been taken before in a small plane, or in any other plane at that time.

Ahern was senior surgeon at the Mater Public Hospital from 1916 to 1938. His work was neat and faultless, and his keenness on hæmostasis must have saved many lives. Intravenous therapy at that period was in its infancy. As I was senior physician at the Mater Public Hospital during that period, we worked a great deal together, and as I was his private anæsthetist, I often helped him in any serious cases at the Mater Public Hospital. We were more or less inseparable professionally almost to the end. Ahern was very keen on the progress of the Queensland Medical School, and was anxious to make the Mater Public Hospital a good clinical school for the students. There were certain difficulties in the way, and the result was the dismissal of most of the staff in 1938, and that was the end of the great plans he had in mind. He was wrapped up in the progress of the Mater Public Hospital—the staff, both doctors and sisters, thought the world of him, and the end of all his good work must have been a great shock to him. He was a great help to all his junior surgeons, and gave them much assistance, and all the operations he thought they could manage.

Ahern had many friends, from the top to the bottom, and in spite of his poor health during the last two years, he kept working and operating moderately. He was an interesting personality, with very definite opinions on politics and other topics. He was a good conversationalist, and was keen on meeting and entertaining all visiting specialists from overseas. He was a member of the Queensland Club and the Queensland Turf Club from his early years in practice. In 1958 he had the honour of being invited by the committee of *The British Journal of Surgery* to write a surgical article for their special number entitled "Special Gordon-Taylor Birthday Number". He contributed an interesting article entitled "Total Thyroidectomy".

Ahern leaves a wife, one daughter married to a United States naval doctor, and two sons. One son is a doctor practising in South Africa, the other son is a businessman in Townsville. Although in poor health, Ahern flew to Africa in 1959 to see his son Edward, on then to England to receive the great honour of Honorary Fellowship of the Royal College of Surgeons of England, and then went to the United States to see his daughter and family. He fortunately arrived home safely, and carried on for nearly a year before his death.

As a member of the Light Horse, Ahern served in the Middle East in the first World War. In the second World War he was temporarily in charge of the 117th Australian General Hospital as major, and later as lieutenant-colonel, from 1942 to 1943.

We all extend to his widow and family our deepest sympathy in their bereavement.

CHARLES NORMAN ATKINS.

WE are indebted to SIR ALFRED ROWDEN WHITE for the following account of the career of the late Dr. C. N. Atkins.

On October 25, 1960, Charles Norman Atkins passed away at Hobart after a short illness due to leukæmia. He was born in Hobart on January 29, 1885, and had an interesting and fine career. He was educated in Hobart, and later came to Melbourne and was in residence at Trinity College of the University of Melbourne where he qualified M.B., Ch.B. in 1911. He later received his D.P.H. at Oxford University in 1920.

On his return to Hobart, he entered general practice, and became Assistant Medical Officer of Health for the Hobart City Council in 1928. During his term of office the incidence of contagious diseases was greatly reduced by the introduction of the immunization scheme, and by his efforts he brought reform in the handling of perishable foodstuffs in the city. He also became a pioneer of health broadcasting, and later introduced regular health broadcasts to school children.

He served in the two World Wars, having enlisted in the Australian Imperial Force in 1914 with the rank of Captain. He was at the Gallipoli landing, and served in other theatres of war with the First Australian Casualty Clearing Station. Early in the second World War he was Director of Hygiene, Southern Command, with headquarters in Melbourne, and in 1941 he wrote the textbook "Hygiene in Simple Language —Military and Civil". He retired with the rank of Lieutenant-Colonel.

Atkins also served for long periods as a member of the honorary staff of the Royal Hobart Hospital, and was Port Health Officer. He was a member of the British Medical Association, and was Vice-President of the Tasmanian Branch in 1939.

In 1941 Atkins was elected a Member of the House of Assembly, and remained so for five years. He was Deputy Leader of the Opposition for twelve months, and then retired from Parliament because of ill health. He was a Fellow of the Royal Society of Health, London, and received a silver medal in 1935 and a Coronation Medal in 1937. He was created a Companion of the Most Distinguished Order of St. Michael and St. George in 1949 for his political and community services.

Atkins was closely identified with cricket, both as a player and, later, as president of the Cricket Association. He was also a keen Royal Tennis player and an enthusiastic fisherman and yachtsman.

On his retirement he lived for a considerable period at the Melbourne Club, and during this period he joined one of the interstate steamship companies as medical officer, travelling to Western Australia and North Queensland.

It was only natural that, with the name of Atkins, amongst his numerous friends he was affectionately known as "Tommy" Atkins.

We extend our sincere sympathy to his three daughters.

NORMAN LENNOX SPEIRS.

We are indebted to Dr. Colin Macdonald for the following account of the career of the late Dr. Norman Lennox Speirs.

In the days before Australia had developed her now flourishing textile industry, the Melbourne merchant princes were warehousemen with imposing offices and softgoods stores in Flinders Lane. Amongst these wealthy importers was the well-known firm of Paterson, Laing and Bruce, the third partner being the father of the present Viscount Bruce. To join this firm in "The Lane" in the sixties came James Speirs, a young man from Manchester. He married Miss Eliza Macallister, and the third of their sons was Norman Lennox, always known as Len. He was born on May 31, 1886, and died at Surfer's Paradise on August 1, 1960, aged 74 years.

Lennox's education commenced at the Caulfield Grammar School, whence at the age of 15 he won a scholarship to Wesley College. This was one of Melbourne's famous public schools, whose then headmaster was L. A. Adamson who came originally from Rugby and Lincoln College, Oxford, and who did much for Victorian education. While in no way neglecting scholarship, Adamson encouraged athletics at Wesley, and quickly set up an ideal of sportmanship of which the keynote was that boys should win decently and lose decently. Justice ruled his work, and he became not only efficient as a headmaster, but thoroughly popular with the boys; there was no want of respect in his nickname "Dicky"—rather a real and genuine affection. He never married, the school taking the place of wife and children. In 1903 Speirs, then aged 16, was one of his prefects. At cricket Lennox was the school's best bowler, with a remarkable average of 1·5; in the champion footballer team he showed dash and cool judgement as a halfback; and at athletics he represented Wesley in the distance races. In this same year he won first-class honours in physics and chemistry at matriculation, and a major resident scholarship to Queen's College in the University of Melbourne.

All that was best and keenest in the university life then centred on the residential colleges, and in that invigorating atmosphere Speirs gained much. The Master of Queen's was Dr. E. H. Sugden, who in his own life reflected those wide sympathies and interests which a good residential college is most fitted to produce. Many men subsequently eminent were contemporary at Queen's with Speirs; among the number were Sir Hugh Devine, Sir Victor Hurley, Sir William Upjohn, Sir David Rivett, F.R.S. (to whom Lennox was as *proxime accessit* as *dux* of Wesley), and Mr. Justice Sir Thomas Clyne. Sugden was a Yorkshireman and a Methodist minister; in addition to a deep knowledge of music and English he possessed a qualification rare among clergymen, a London science degree. Speirs would speak in high terms of Sugden's beneficent influence and of his warm and generous understanding of his resident students. Speirs

became a triple blue; he played in the University XI for no fewer than six years, was captain in 1909, and represented Victoria against England and against South Australia. Queen's had some very good cricketers in those days, including P. R. Le Couteur, who later, as a Rhodes Scholar, achieved the all-round record in the 1910 Oxford versus Cambridge match, taking 11 wickets for 66 runs and making 160. Speirs was a sound bat, but shone as a medium-fast bowler; his best intercollegiate feats were 7 for 11 against Trinity, and 128 against Ormond on a sticky wicket facing the bowling of G. R. A. Hazlitt, a member of both the Victorian and the Australian elevens. Speirs also played inter-varsity football (Australian rules) and was captain of the university baseball team. After leaving the university he took up golf, and in a short time won three times the championship of the Yarra Yarra Club, later playing successfully at the Victoria and Royal Melbourne Clubs. In later years he included bowls amongst his recreational accomplishments, was three times champion of Fitzroy and four times of M.C.G., and in 1933 won the coveted "Champion of Champions" of Victoria. An all-round bowler, he was adept at the draw shot and that firm "yard-on" shot which so often can completely change the complexion of a match. I doubt if any man from the University of Melbourne had a more varied and successful sporting record.

Graduating in 1909 as ninth in the year, Speirs became a resident medical officer, first at St. Vincent's Hospital and then at the Melbourne Hospital; thence he went to the Women's Hospital, where he met Dr. George Horne, then the senior honorary surgeon, and a notable university lecturer in obstetrics and gynæcology. Commencing practice in 1911 with Horne at an initial salary of £200 a year and keep, Speirs later became a partner. In 1914 he was appointed to the honorary Staff of the Women's Hospital. He was then aged 30 years, and was the youngst man ever to realize this ambition. At that period in the history of the Women's Hospital, young graduates who had been

reliable residents and who had attracted the favourable attention of a senior honorary stood a chance of appointment to the honorary staff without those higher surgical degrees that even then were demanded in the general hospitals. Surgical technique was learnt by assisting the seniors in the theatre. It was far from a lengthy or intensive post-graduate training, yet many became good surgeons; this is the more noteworthy when it is realized that they were without the valuable discipline of post-graduate anatomy, physiology and pathology.

Speirs soon became a reliable and deft surgeon within the compass of the restricted gynæcological surgery of that time. He was fortunate that his partner and friend George Horne, whom he had joined in general practice at the nearby suburb of Clifton Hill, only two miles from the Women's Hospital, was one of the foremost gynæclogists in Australia. Horne proceeded overseas in early 1914, and at the outbreak of war was in England, where he was accepted for service with Royal Army Medical Corps. This prevented Speirs from at once joining the Australian Imperial Force, and it was not until Horne's return in 1917 that Speirs finally left Australia with reinforcements for France. After the armistice he was chosen to play with the A.I.F. cricket team, but had to return quickly to Australia to take over the practice because of Horne's failing health.

When the second World War came, Speirs, aged 54 and a colonel in the Australian Army Medical Corps, was asked to form the 2/4 Australian General Hospital; as colleagues he had C. W. B. Littlejohn, O.C. Surgical Division, and Eric Cooper, O.C. Medical Division. Embarking on December 24 in *Mauretania*, the unit arrived at Colombo where the magnificence of the Cunarder gave way to the austerity of a regular trooper—*Nevasa*. The convoy formed up outside Colombo, and on arrival at Suez entrained to Abd-el-Kader, a lonely wayside station 20 miles west of Alexandria; there lay *Knight of Malta*, of 1500 tons, formerly a ferry between Malta and Italian ports, now pressed into transport service, but still "an evil-smelling tub" in Speirs' words. There were no messing facilities, each man having to draw rations for 24 hours; 120 men with all gear and personal equipment were installed in the hold measuring 60 by 30 feet, approached by one vertical ladder and dimly lit by one hatchway. A very heavy Mediterranean storm drove the vessel aground between Bardia and Tobruk. All men and equipment were saved, and soon they were operating a hospital of 350 patients at Barce in place of the 2/7 Field Ambulance. Seven days later a sudden evacuation was made back to Tobruk. With Rommel's sharp attack, the rear party at Barce just escaped to participate in the famous Benghazi handicap. Happily the equipment was saved, and this enabled the unit to perform work said to be unprecedented in military history—the carrying on of a general hospital of 1000 patients within a fortress and without a female nurse. There remained only two male nurses (trained in the unit), 25 nursing orderlies and 20 ward orderlies. Tobruk was to be held at all costs, and as all land outlets were cut, the historic siege commenced. Finally relieved at the now famous Cyrenian port, the unit came home via Ceylon. Back in Australia, Speirs opened his unit again at Redbank in Queensland, where it acted as an overflow hospital to Greenslopes, Brisbane. Later, Speirs was appointed Deputy Director of Medical Services, Victorian Lines of Communication, and he undertook important duties associated with the demobilization of medical personnel, and presided over the Victorian Medical Coordination Committee. The war's end found him in the sixtieth year of a life which had ranged through a wide gamut of human activity, and which was fitly honoured by his creation as a Companion of the Most Excellent Order of the British Empire in 1942. His retirement was spent mainly at the Melbourne cricket ground playing bowls and watching cricket and football, at the Royal Melbourne and Barwon Heads golf clubs, and at the Australian Club demonstrating the nuances of those laws which are according to Hoyle.

Speirs was a superb bridge and poker player. The writer still remembers one evening before dinner after an Army Medical Staff ride many years ago at the Macedon Golf Club—most comfortable and pleasant were those rides—being importuned by two bridge sharpers, whose anonymity must still be preserved because of their now exalted rank. All was set to pluck this pigeon whose sporran was shaking at the thought of rapidly losing bawbees. By a stroke of fortune, in sauntered Len Speirs, who was eagerly claimed by the neophyte as a partner. Len's only admonition was not to lead from king and another; mercilessly playing with the right hand and simultaneously smoothly picking up with the left, in the space of 20 minutes he had the two "con men" disorganized. After the first lead, Len had known the position and value of every card in every hand. He eschewed all small talk, he played to win, believing that any game was not worth playing otherwise, though scorning Potter's gamesmanship. He belonged to a generation of all-round men, forthright and trusty, who should not be forgotten in a later age of specialism and sophistication.

In 1916 Lennox Speirs married Miss Marjorie Dunn, who survives him, with a daughter and a son, Dr. Norman L. Speirs, the Melbourne gynæcologist.

DR. ALEX SINCLAIR writes: Lennox Speirs is best remembered by many ex-servicemen of World War II as the Commanding Officer of the Fourth Australian General Hospital. This unit numbered amongst its original officers men of the calibre of Charles Littlejohn, Eric Cooper, Douglas Thomas, Jock Chambers, "Zack" Schwartz, Marshall Renou, Tom Tyrer, Arthur Amies, Vin Rudd and Bishop Riley. It saw active service for the first time throughout the siege of Tobruk, and later served in Palestine and Australia. In the desert the Fourth Hospital lacked most of the hallmarks of an impersonal regimentally precise military hospital; but there were other qualities which lent their own distinction. The greatest and most useful of these was its record of a busy family unit bent on getting a job done with the maximum of individual effort and the minimum of frustrating regulation. Lennox Speirs set the tone for this attitude of individual responsibility with the ease of an assured playing captain and coach. The unit worked without the benefit of trained nurses, with inadequate equipment, under trying living conditions in an area subjected to daily bombing attack. The tide of war was in the wrong direction, most men became anxious, and the ingredients for cracking morale were all there. It was Lennox Speirs who, by personal example, ensured that this never happened, and that the unit continued to function with distinction under these difficult conditions. He did this by personal contact and by an example of stubborn fearlessness. He usually protected his head from falling débris with a faded topee and his directions were nearly always delivered by mouth on the spot in a tone of growling criticism, encouraging banter or incisive chaffing. When others felt inclined to complain of their unhappy personal lot, he reserved his curses for his smoker's cough, his bridge hand or the fluctuating fortunes of a chess game.

The experiences of the unit in Tobruk cemented Lennox Speirs inextricably with the men who served him in a bond which was not broken till his death. Right up to this time he remained in contact with most of his old unit, and never quite relinquished the role which he fulfilled so adequately in war time, and which returned him so much personal satisfaction in the years that followed.

SIR GORDON GORDON-TAYLOR.

WE are indebted to DR. K. B. NOAD for the following further appreciation of the late Sir Gordon Gordon-Taylor.

Though he died on September 3, 1960, the receipt a few weeks ago of the familiar Christmas card, with its picture of Lords and the careful heavy script of Sir Gordon Gordon-Taylor, prompts me to add a brief appreciation to Douglas Miller's moving tribute to him in the journal of October 15. He referred chiefly to Gordon-Taylor's eminence in surgery and his influence on, and help to, young surgeons from this country. But I would like to stress another facet of the mind of this remarkable man. Sir Gordon Gordon-Taylor was a scholar whose knowledge of the classics was intimate and profound. He could produce an appropriate Latin or Greek quotation on any occasion. In his address at the annual dinner of the Horatian Society, of which he was chairman, on July 21, 1958, he said that Horace's indignation at the thought of a surgeon participating at a festive dinner held in the poet's honour "might have been lessened on hearing that a volume of his poems had been thumbed by that surgeon for more than seventy years, and that with a copy of the Odes in his pocket he had visited every continent in the world except South America". It had even accompanied him to Russia. Scholarship was once the foundation upon which a doctor built his professional edifice. But this structure of times gone by has been made more difficult, if not swept away entirely, by the pace of modern life and modern medicine. With Gordon-Taylor's death, not only has a great surgeon and the doyen of British surgery passed from the scene, but medicine has lost one of its greatest scholars. In his commemorative oration on the

occasion of the Diamond Jubilee of the Royal Army Medical Corps, a positive *tour de force* delivered without a note, he said: "*Omnia fert aetas, animum quoque*:[1] yet would I dare to challenge the last fragment of this sad Virgilian line." We would join him in that challenge, for the memory of Gordon Gordon-Taylor will remain with all those who had the privilege of his friendship as long as they live. *Vale*, G.-T.

Correspondence.

DEAN'S BRITIC SPELLING.

SIR: Unhapi skwl ujustmnt and its trajik siikwlz ar ofn diw larjli tu xi ilojikl, wystfl spelin' ov In'glic. R. Deans, 17 Midland Road, Leeds 6, England haz suksiidid in reknsailin' meni riform enx'iwsiasts in hiz Wurld Lan'gwij Asqsiycn "Britic" spelin' az iwzd hiur. U pailut ekspurumnt wix u riformd alfubet iz undur wy wix u fiw x'awznd guvurnmnt skwl tciidrn in In'glund. Ediukycnists biiiiv it wil spiid lurnin' ov klasikl spelin', and if waidli udoptid riplys "Jonsunliz" spelin', kut skwl wurk bai at liist u iilur, inkriis xi oriredi waid iws, undurstandin' and kultiurul import ov In'glic, and iwnifai prununsiycn standuds. (Xis spelin' iz byst on Britic Brawdkastin' Korpurycn spiitc.) Az mqst importnt muteriul iz riiprintid or rivaizd iitc fiw liiurz, x qld spelin' wud seldm bi niidid. X folqin' iz u kii tu tcynjiz sujestid: A can; can't. AI shanghai. AR are. AW gauss. C ocean. C' fusion. E en. ER ere. I in; onion. II kiwi. IW ewe. L lo; able. M me; chasm. N no; didn't. N' ink. O on. OR or; awe. Q oh. R re; are ere fur. TC itch. U pukka; put. UR earner; error. W we; crew. X bathe. X' bath. Y hey. Apostrophes optional. Block capitals routinely used, for quick reading, clarity and compactness (as in notices, headings, telegrams and so on).

Yours, etc.,

The Talbot Clinic, Rockhampton, Queensland.
D. EVERINGHAM,

December 17, 1960.

MEDICAL JOURNALS FOR INDONESIA.

SIR: I have received a request from an Indonesian friend, who was recently appointed to the teaching staff of the Gadjah Mada University, Indonesia, for copies of recent medical publications. During a three-year term of lecturing in chemistry at the above university, I observed that the inadequate library facilities and the expense and difficulty of obtaining foreign exchange for subscribing to scientific journals greatly hamper any attempt to keep abreast of new overseas developments.

Possibly, some of your readers have copies of medical journals for the last year or two, which they no longer require. If so, I should be pleased to receive them for forwarding to Indonesia, with the assurance that they will be of immediate benefit to the teaching of medicine in Indonesia.

Yours, etc.,

15/6 Everton Road, Strathfield, N.S.W.; or
C/- Aust. Atomic Energy Commission Research Establishment, Lucas Heights, N.S.W.
HAROLD J. WHITFIELD.

RETINAL HÆMORRHAGES ASSOCIATED WITH THE ADMINISTRATION OF "BUTAZOLIDIN".

SIR: I have collected five cases of retinal hæmorrhages in cases which have been on "Butazolidin" therapy for rheumatoid arthritis over a long period. They all follow the same pattern, but I shall report Mrs. I.H., aged 66, who was seen by me on May 30, 1960. She had suffered from rheumatoid arthritis for 16 years. In August, 1958, she was given 200 mg. of "Butazolidin" twice daily and occasionally three times a day up to the day I saw her. Eight weeks prior to my seeing her, the sight in her left eye had been failing. Examination of the fundi showed flame-shaped hæmorrhages around both disks and the macula of the left eye. The vision in her right eye came up to 6/9 with correction, but in the left it was 6/36 and it would not improve. I rang her general practitioner, who said that her blood pressure and urine were normal, and I suggested that he take her off "Butazolidin" and put her on some other treatment for the rheumatoid arthritis. I last saw her on December 8, 1960, when the vision in her right eye corrected to 6/6 and in the left to 6/9, and the retinal hæmorrhages had disappeared.

I wrote to Geigy Pharmaceuticals, and asked them if any cases of retinal hæmorrhages in conjunction with the use of "Butazolidin" had been reported in the medical literature, and they said they were not aware of any such cases having been reported. For this reason, I thought it high time that someone did so.

In all my cases, the hæmorrhages have disappeared after discontinuing the "Butazolidin". I have not included cases which have been complicated by hypertension, arteriosclerosis or renal abnormalities.

Yours, etc.,

163 North Terrace, Adelaide.
A. L. TOSTEVIN.

December 19, 1960.

[1] "Time carries everything away, even the memory"—Virgil, *Eclogues*, IX, 51.

Medical Matters in Parliament.

HOUSE OF REPRESENTATIVES.

THE following extracts from *Hansard* relate to the proceedings of the House of Representatives.

December 1, 1960.

Alcoholism.

MR. KEARNEY: My question, which is addressed to the Minister for Health, refers to the treatment of alcoholism as a disease and not as a form of delinquency. I ask the Minister whether it is a fact that tests are being conducted in Australia to prove the efficacy of a new drug named librium, believed to have been developed in Switzerland. Can the Minister affirm that rather distinctive success has been claimed for this drug both in America and the United Kingdom as an effective cure for alcoholics? Will he say whether this drug will be generally available in Australia in the near future, and will he take steps to have it included in the list of free drugs under the *Pharmaceutical Benefits Act*?

DR. DONALD CAMERON: I am not particularly familiar with the drug mentioned by the honourable member, but I understand that from time to time various drugs are investigated for the treatment of alcoholism. Before they are admitted to the list of pharmaceutical benefits, of course, they would need to be examined by the advisory committee, and the Government as usual would act on the advice of the committee.

December 6, 1960.

Commonwealth Serum Laboratories.

MR. CAIRNS: I ask the Minister for Health whether it is a fact that the Commonwealth Serum Laboratories are soon to cease production of penicillin and insulin, and that many of the employees will join those of the aircraft industry and the motor car industry on the labour market. Also, is it a fact that the Commonwealth Serum Laboratories have been reduced almost to bankruptcy under their present management, and that this and the proposal to stop production of penicillin and insulin are part of a plan to sell out the laboratories to an American chemical monopoly?

DR. DONALD CAMERON: I understand the honourable gentleman's vested interest in misery, but let me tell him that his question is couched in greatly exaggerated terms. It is true that, owing to the large stocks of penicillin and insulin which are held, the production of those items will be greatly diminished at the Commonwealth Serum Laboratories. It is quite untrue that there is any intention to sell the laboratories, as was made perfectly plain by the Government earlier this year. Sir, these are the normal trading activities of any business. Once you have a surplus of any product

it is useless to increase that surplus. I answered a question in this House the other day in which I indicated that the laboratories were exploring methods of producing other penicillins. The activities of the laboratories will be carried on, but they will be carried on on a sensible basis.

December 6 and 7, 1960.

National Health and Medical Research Council.

MR. WHITLAM asked the Minister for Health, upon notice:

What requests or suggestions were made at the October meeting of the National Health and Medical Research Council for legislative and administrative action by the (*a*) Commonwealth, (*b*) Territories and (*c*) States?

Dr. Donald Cameron: The following are the resolutions of the fifteenth session of the National Health and Medical Research Council held in Canberra on 27th and 28th October, 1960:

Resolution 1.—Malaria—That in States where malaria is notifiable the opportunity of notification should be taken to ensure that the patient receives treatment to eradicate infection.

Resolution 2.—Infected Coconut—(1) That in view of the findings of salmonella organisms in a number of samples of desiccated coconut, further importations of this commodity should be prohibited, unless satisfactory evidence is produced that it is manufactured under suitable hygienic conditions and is free from harmful organisms.

(2) That the Commonwealth Department of Health investigate the practical value of ethylene oxide or similar gas for the sterilization of desiccated coconut, at ports of entry into Australia.

Resolution 3.—Advertising of Proprietary Medicines—That the following section of the *Broadcasting and Television Act* be amended:

> "100.—(6). A licensee shall not broadcast or televise an advertisement relating to a medicine unless the text of the proposed advertisement has been approved by the Director-General of Health, or, on appeal to the Minister under this section, by the Minister."

and that an amendment along the following lines be substituted:

> "A licensee shall not broadcast or televise an advertisement relating to—
>
> (i) a substance or appliance for which a therapeutic use is claimed, or
>
> (ii) a substance, appliance, method or technique for which cosmetic and/or physiological advantages are claimed, unless the text of the proposed advertisement has been approved by the Director-General of Health, or, on appeal to the Minister under this section, by the Minister."

Resolution 4.—Gonorrhœa—(1) That the necessity of taking specimens for laboratory examination prior to the commencement of treatment be emphasized to the medical profession and the medical student.

(2) That standard procedure for diagnosis of gonorrhœa in the female should include—

(*a*) the examination of smears from vagina, urethra and rectum;

(*b*) culture of material from these sites, and that State authorities should ensure that adequate facilities for bacteriological diagnosis including culture are readily accessible.

Resolution 5.—Non-specific Urethritis—That the National Health and Medical Research Council extend financial support to intensive research into the causes of infective non-specific urethritis.

Resolution 6.—Notification of Venereal Disease—(1) That all States adopt and use the form of notification in current use in Queensland with substitution of the words "present condition" for the words "same complaint" in question 9.

(2) That the National Health and Medical Research Council take such steps as it may consider proper for the purpose of securing full collaboration of the armed services with the health authority, in the notification of venereal disease and in the application of Venereal Diseases Acts and Regulations.

Resolution 7.—Treatment of Venereal Disease—That laboratories in all States should undertake tests to ascertain the sensitivity of strains of gonococcus to penicillin and that medical practitioners should be asked to report promptly all cases failing to respond to standard penicillin therapy.

Resolution 8.—Tracing of Infective Source of Venereal Disease—That in the State Venereal Diseases Acts, the penalty for discontinuing treatment before discharge should be raised to £100 or imprisonment for six months.

Resolution 9.—Diagnosis for Syphilis—(1) That the standard of diagnosis for early syphilis should demand—

(*a*) Careful clinical examination of the lesion;

(*b*) dark ground examination of a smear from the lesion;

(*c*) serological examination comprising a complement fixation test and any other, e.g., flocculation.

(2) That the National Health and Medical Research Council refer to the College of Pathologists for study and report its proposals that serological diagnostic tests should be reported as positive (complete hæmolysis or complete flocculation), negative or indeterminate and that the present practice of reporting in degree of positive reaction should be abandoned.

(3) That the National Health and Medical Research Council refer to the College of Pathologists the proposal that that body should consider the need and practicability of establishing a reference laboratory in Australia to undertake on request, special serological examinations including the Treponema Immobilization test.

The Council resolved to refer to the College of Pathologists of Australia for advice, the Committee recommendations on serological diagnostic tests. The advice of the College will be considered by the Public Health Committee, with a view to preparing recommendations for submission to the next meeting of the Council in May, 1961.

Resolution 10.—Quadruple Antigen—(*a*) That the Commonwealth Serum Laboratories should make Quadruple Vaccine available as from 1st February, 1961, in quantities sufficient to meet the requirements of infant immunization.

(*b*) The dosage required for the five doses should be determined by the Epidemiological Committee in collaboration with the Australian Pædiatric Association.

(*c*) Quadruple Vaccine will be distributed by the same method and under the same conditions as apply to Poliomyelitis Vaccine.

(*d*) The Council notes that the introduction of Quadruple Antigen will entail considerable change in the current methods of immunizing infants. The Council emphasizes that it will be necessary for the medical profession to be thoroughly informed upon the proposed methods of distribution and the techniques of immunization and the reasons for them, and considers that special measures should be taken to obtain the active cooperation of the profession in achieving a satisfactory level of protection.

(*e*) In order to prevent tetanus and to minimize the risks attaching to the use of anti-tetanic serum, the Council advocates the active extension of tetanus immunization. For this purpose the Council recommends that States should use the opportunity afforded by the medical profession's cooperation in the administration of Quadruple Vaccine to enlist its assistance in publicizing the value and extending the use of Tetanus Toxoid and Poliomyelitis Vaccine in the older age groups.

Resolution 11.—Medical Record of Birth—(i) That in those States where there are statutory deficiencies, the Registrar-General should be given statutory power to require any prescribed information of births and deaths, including information which is not required for the purposes of registration and which need not be recorded in the birth and death registers.

(ii) That the definition of still-born child and requirements relative to the registration thereof be deleted from appropriate Acts.

(iii) That birth be defined as follows in Births, Deaths and Marriages Acts:

> "Birth" and "Birth of a child" means, for the purposes of registration and reporting of particulars, the expulsion or extraction from its mother of a fœtus of 20 weeks gestation or over.

(iv) That the period within which a birth is required to be registered be reduced from 60 to 30 days.

(v) That medical practitioners be required to furnish a report of every birth as in (iii) above where a fœtus is born dead, or the child does not survive 28 days.

(vi) That key definitions of 20 weeks gestation and the determination of a live birth be referred to the Medical

Statistics Committee and the Committee of the College of Obstetricians and Gynæcologists.

(vii) That the Medical Statistics Committee with suitable coopted members compile the details of the report required from medical practitioners as in (v) and all States adopt this report.

Resolution 12.—Medical Research in Australia—(1) That a full time Executive Officer be appointed. The Executive Officer should be a person of high academic qualifications and experience in medical research.

(2) The status of the Executive Officer should be such that he will have access through the chairman of the Council to the responsible Minister on matters concerned with medical research.

Resolution 13.—Ante-partum Hæmorrhage.—The Council resolved that with the adoption of the 20th week of gestation as the point after which a medical record of birth will be required. Ante-partum Hæmorrhage shall be defined as follows:

> "Hæmorrhage occurring after the twentieth week of gestation, from the first day of the last menstrual period."

Cortisone.

MR. SNEDDEN: I direct my question to the Minister for Health. Because of the cost and the nature of the drug cortisone, will the Minister consider including it on the pharmaceutical benefits list in all cases in which a medical practitioner sees fit to prescribe it, without limiting the medical practitioner to specified disabilities?

DR. DONALD CAMERON: The question of the inclusion of drugs on the pharmaceutical benefits list is not determined purely on cost. Cortisone is one of the group of drugs which exert the most profound effects on physiology and which have to be used with the greatest caution. The Government is advised as to whether it should make such drugs available, and upon what conditions by an expert committee of doctors and pharmacists, upon which the doctors predominate. It is guided by the advice of this committee. So far the committee has not considered it advisable to make cortisone generally available. I realize that some doctors consider that the restrictions are perhaps too narrow but, as this is a matter of opinion, no absolute verdict can ever be obtained upon it. In the meantime I am sure the honourable gentleman will agree that such restrictions as are advised by the committee should be adhered to. The use of cortisone and of cortisone derivatives has been steadily increased by the committee from the time when cortisone, the original member of this series, was first placed on the list.

SENATE.

THE following extracts from *Hansard* relate to the proceedings of the Senate.

December 2, 1960.

Repatriation General Hospital, Hobart.

SENATOR COLE: Will the Minister for Repatriation give a progress report on the building of the Hobart Repatriation Hospital? How much money has been spent and is there any planned work still to be completed?

SENATOR SIR WALTER COOPER: The repatriation hospital at Hobart is being built according to plan. It is expected that the work will be finished this year. From memory, I cannot tell the honourable senator the total expenditure so far. I think it is of the order of £200,000, but I ask him not to tie me down to that figure. The work is going on, and, so far as I know, it will be completed on time. There was some difficulty with the foundations, owing to the rock formation, and this caused a slight delay, but I understand that the difficulty has been overcome and that fairly good progress is being made.

Hearing Aids for Pensioners.

SENATOR POKE asked the Minister representing the Minister for Social Services, upon notice:

1. Will the Minister make provision for the supply of hearing aids free to pensioners?

2. Is it a fact that the maintenance of a hearing aid costs approximately three shillings per week which has a considerable effect on a pensioner's income?

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 10, 1960.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory	Australian Capital Territory.	Australia.
Acute Rheumatism	1	1(1)	2(2)	..	..	1(1)	..	..	5
Amœbiasis	..	..	..	..	..	..	..	..	..
Ancylostomiasis	..	..	..	..	..	..	3	..	3
Anthrax	..	..	..	..	..	..	..	..	..
Bilharziasis	..	..	..	..	..	..	..	..	..
Brucellosis	..	..	..	..	..	..	..	..	..
Cholera	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus)	..	..	..	..	..	..	..	..	..
Dengue	..	..	..	..	..	..	..	..	..
Diarrhœa (Infantile)	6(4)	9(6)	1(1)	..	..	..	46	..	62
Diphtheria	..	..	..	..	..	..	..	..	..
Dysentery (Bacillary)	..	..	2(2)	..	..	..	..	..	2
Encephalitis	1(1)	1(1)	..	..	..	..	1	..	3
Filariasis	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice	..	1	..	..	..	..	..	..	1
Hydatid	..	..	..	..	..	..	..	..	..
Infective Hepatitis	220(111)	66(40)	23(7)	69(23)	6(4)	..	..	7	391
Lead Poisoning	..	..	2	..	..	..	..	..	2
Leprosy	..	..	..	..	..	..	1	..	1
Leptospirosis	..	..	1	..	..	..	..	..	1
Malaria	..	..	..	..	..	..	..	..	..
Meningococcal Infection	2	..	..	..	..	..	..	..	2
Ophthalmia	..	..	..	..	2	..	..	..	2
Ornithosis	..	..	..	..	..	..	..	..	..
Paratyphoid	..	..	..	..	..	..	..	..	..
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	3(2)	..	..	..	..	1(1)	..	..	4
Puerperal Fever	..	..	..	..	..	..	..	..	..
Rubella	13(10)	..	2(2)	4(4)	..	..	..	..	19
Salmonella Infection	..	..	1(1)	..	..	..	..	..	1
Scarlet Fever	7(4)	14(9)	5(3)	1(1)	1(1)	1	..	..	29
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	1	1	..	..	..	..	..	..	2
Trachoma	..	..	..	..	61	..	..	..	61
Trichinosis	..	..	..	..	..	..	..	..	..
Tuberculosis	48(30)	19(19)	23(11)	1(1)	2(1)	6(3)	2	..	101
Typhoid Fever	1(1)	..	..	..	..	..	..	..	1
Typhus (Flea-, Mite- and Tick-borne)	..	..	..	..	..	..	..	..	..
Typhus (Louse-borne)	..	..	..	..	..	..	..	..	..
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] Figures in parentheses are those for the metropolitan area.

SENATOR WALTER COOPER: The Minister for Social Services has supplied the following reply:

1 and 2. The Department of Social Services provides hearing aids free of cost to pensioners and beneficiaries who are accepted for treatment and training under the Commonwealth Rehabilitation Service. The Commonwealth Department of Health makes similar provision for school children who require hearing aids and the Repatriation Commission for war widows and certain classes of ex-servicemen. Apart from these instances the view of successive Commonwealth Governments has been that the provision of hearing aids and the replacement of batteries is more properly a function of the State Governments and voluntary welfare agencies.

Notes and News.

The Medico-Legal Society of New South Wales.

A general meeting of the Medico-Legal Society of New South Wales will be held on Wednesday, February 1, 1961, at 8 p.m., at the Robert H. Todd Assembly Hall, British Medical Association House, 135 Macquarie Street, Sydney. At this meeting a discussion on the subject "The Assessment of Claims of Amnesia in Major Crime" will be introduced by Desmond Curran, Esq., M.B., B.Chir. (Cambridge), F.R.C.P., D.P.M. (London), Senior Psychiatrist, St. George's Hospital, London, and J. J. Davoren, Esq., Q.C., of the Sydney Bar. The Honorary Secretaries of the Society are H. Hunter, 135 Macquarie Street, Sydney (telephone 27 8211), and I. F. Sheppard, 180 Phillip Street, Sydney (telephone BW 3437). The Honorary Treasurer is B. Ross Jones, 67 Castlereagh Street, Sydney (telephone BW 2971).

Fourth International Congress of Angiology.

The Fourth International Congress of Angiology, organized by the *Union internationale d'angéiologie*, of Paris, will be held in Prague, Czechoslovakia, from September 4 to 9, 1961. The main theme of the Congress is "Metabolism of the Vascular Wall". The preliminary programme comprises 50 general reports under two sections, as follows: Section A, biology and histochemistry; Section B, physiopathology and clinics. Communications to these general reports will be accepted up till February 1, 1961. Further information may be obtained from the Secretary-General of the Congress, Prof. Dr. Z. Reinis, IV Medical Clinic, Unemocnice 2, Praha, Czechoslovakia.

Fifth World Assembly of the Israel Medical Association.

The Fifth World Assembly of the Israel Medical Association will be held in Jerusalem, Haifa and Tel Aviv from August 14 to 25, 1961. Further information may be obtained from the Honorary Secretary of the Australian Fellowship of the Israel Medical Association, Dr. F. G. Silberberg, 14 Collins Street, Melbourne, C.1, Victoria; telephone, 63 1274.

Notice.

SECTION OF OCCUPATIONAL MEDICINE, N.S.W. BRANCH OF THE B.M.A.

THE annual meeting of the Section of Occupational Medicine of the New South Wales Branch of the British Medical Association will be held on Friday, January 20, 1961, at 7.30 p.m., in the Theatrette of I.C.I. House, 69 Macquarie Street, Sydney. In addition to the election of office bearers there will be one or two films of interest.

Honours.

NEW YEAR HONOURS.

DR. DENIS JOHN BROWNE has been created a Knight Commander of the Royal Victorian Order.

In the issue of January 7, 1961, it was stated that Professor Sydney Sunderland had been created a Commander of the Most Distinguished Order of St. Michael and St. George. Professor Sunderland has in fact been created a Companion of that Order. We regret the error.

Deaths.

THE following death has been announced:

JONA.—Jacob Jona, on January 5, 1961, at East Melbourne.

Diary for the Month.

JANUARY 16.—Victorian Branch, B.M.A.: Finance Sub-Committee.
JANUARY 17.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JANUARY 19.—Victorian Branch, B.M.A.: Executive Meeting of Branch Council.
JANUARY 24.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JANUARY 25.—Victorian Branch, B.M.A.: Branch Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Editorial Notices.

ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

Authors of papers are asked to state for inclusion in the title their principal qualifications as well as their relevant appointment and/or the unit, hospital or department from which the paper comes.

References to articles and books should be carefully checked. In a reference to an article in a journal the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of article. In a reference to a book the following information should be given: surname of author, initials of author, year of publication, full title of book, publisher, place of publication, page number (where relevant). The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary is stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2-3.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this Journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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